THE
# ELECTRICAL REVIEW

Volume CXXVII No. 3280

Friday, October 4th, 1940

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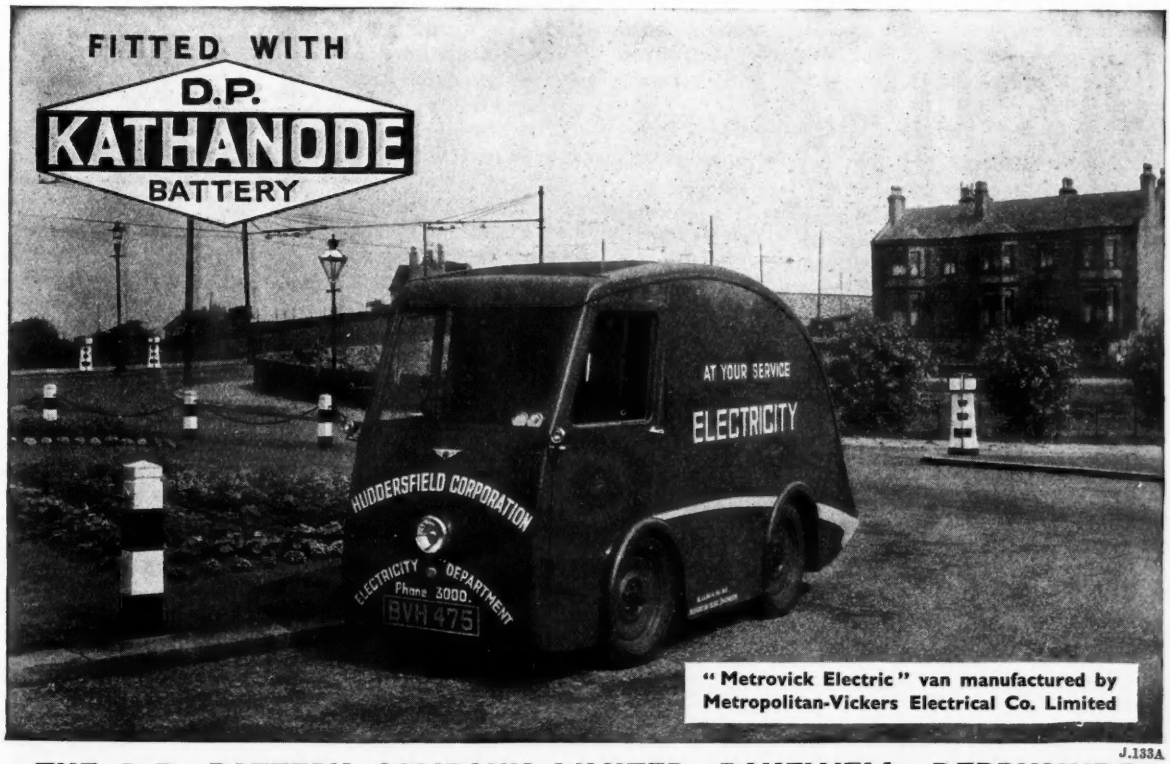


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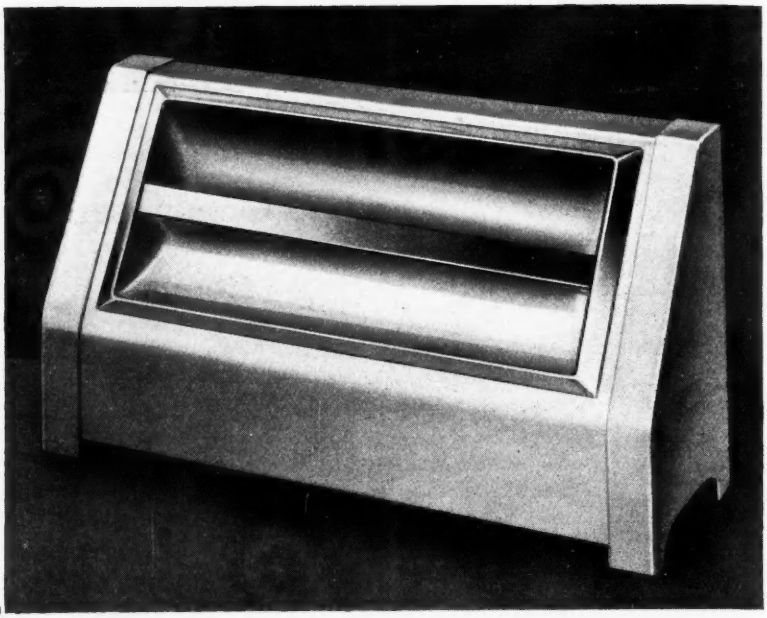

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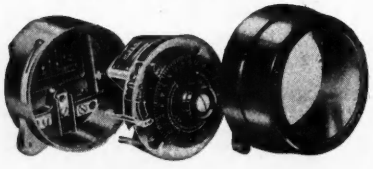

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THE
# ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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# Registration of Engineers

## American Proposals

A FEW years ago the late Professor W. Cramp, addressing the British Association, advocated the setting up of a body with statutory powers to define the qualifications of persons entitled to call themselves engineers. The aim was to prevent unskilled persons from jeopardising life and to check unprofessional conduct. Shape was more recently given in the United States to a similar idea in a draft model law which has been drawn up by the American Institute of Electrical Engineers. The document is based upon certain principles, prominent among which is the sound doctrine that legislation of this kind should be restricted to public benefit, any advantage to practitioners being merely incidental. Since engineering is now recognised as so much a part of the nation's life, it is of some importance to consider what standards of professional conduct are, or ought to be, aimed at by its practitioners.

The main purpose of the " Law for the Registration of Engineers " is to safeguard life, health and property by instituting standards of competence which should be regarded as minimum qualifications for those engineers, termed " professional engineers," who offer service for hire to the public or who are engaged in the execution of public projects or who are public employees. This category might appear at first glance to cover most electrical engineers. This is not so, however, as the criterion is final responsibility for work in which engineering service is the ultimate objective as a business enterprise and for profit. Structural engineers are, nevertheless, included on the ground that even as employees they are responsible, in some degree, for work involving public safety. It is stated that no evident public benefit would follow statutory registration of employee engineers engaged in manufacture or in public utilities since final decisions in regard to their duties lie with legally responsible bodies.

### Excluding " Quacks "

The general intention of the proposed legislation is, clearly, to warn off charlatans from the planning and control of public schemes. If, however, structural engineers are also to be subject to compulsory registration from similar considerations of public safety, is it logical to exclude, say, the designers of machinery required for supplying electricity and the men in charge of its construction and operation? Any shortcomings here may well have serious consequences to " health, life and property."

It may be argued that responsible organisations would engage only competent men, but that does not necessarily follow. In any case a definite status is a help to the engineer in keeping his end up with laymen when questions of expenditure are under discussion. Men at the top, however, are not the only ones concerned with public safety. Those in comparatively subordinate positions often have a status compulsorily assigned to them. Thus, it has long been accepted that marine engineers should have Board of Trade " tickets," while strong reasons have been advanced for according similar recognition to the skill required of colliery electricians—all in relation to the safety of others.

The same reasoning holds good, to a lesser degree, with regard to electrical engineers in factories. It also holds good for contractors not engaged in planning, who are specifically excluded from the draft law. Yet they or their supervisors and wiremen may easily cause danger by faulty execution of good original designs without incurring the penalty of forfeited statutory certificates. Moreover, the installation engineer is in closer touch with the public as a whole than any other.

### Institution Membership Qualifies

It would appear, indeed, that registration would be more desirable on the detailed and practical side of engineering than it would be for those who prepare the general plans. This is, of course, on the assumption that the latter belong to one of the major engineering institutions. A corporate member of the I.E.E., for example, could be regarded as possessing the technical qualifications and the requisite experience without further conditions, since the preliminary qualifications prescribed in the draft law are not up to the standard of those required for associate membership of the I.E.E., which has the further advantage of entailing adherence to a professional code calling for a high standard of conduct. For those who devote their whole time to advising the public there is the additional code of the Association of Consulting Engineers, more particularly with regard to independence of manufacturing and contracting interests.

In his chairman's address to the I.E.E. at Manchester two or three years ago, Mr. J. W. Thomas expressed the opinion that legal certification with the object of protecting the title " engineer " was not a live issue, and suggested that a recognised hall-mark of proficiency would come about in time through the general practice of those engaging engineers. That is probable, but it implies the need to educate the public to appreciate

the value of the engineer to the community. We have the organisation to do that in the Engineering Public Relations Committee, which is the product of collaboration between the major institutions. This way will be longer and more arduous than the path of legislation, but the result will be all the better because the status of engineers will be based upon public conviction of the worth of the services they render and not upon statutory privileges.

**Technical Progress Committee**

IN the course of an article in our issue of July 26th, Mr. E. A. Pinto suggested the establishment of a "Joint Technical Progress Committee" to organise lectures, papers and discussions for men engaged in the electrical contracting industry. It was thought that such a committee would help to remedy the present state of affairs in which contractors find it most difficult to keep up-to-date technically. The nucleus of the committee would be provided by the Electrical Contractors' Association and the Association of Supervising Electrical Engineers, and other interested bodies would be asked to co-operate. The September *Electrical Supervisor* (the A.S.E.E's official journal) says that the subject is receiving the serious consideration of the Executive Council and in the first place the matter has been referred to the Past-Chairmen's Panel which will examine the advantages and disadvantages of the suggestion and report to the Council. In the meantime, members and their friends are reminded that the Association's programme of lectures is being proceeded with and visitors are welcomed. The programme was reproduced in our issue of August 23rd.

**War Emergency Stations**

THE two new generating stations to be erected in the S.E. England and the S.W. England and S. Wales regional areas under the two amending Schemes particularised in this issue are intended to meet war requirements and not the normal growth of load on the grid system. Initially they are not very large as selected stations go nowadays, the first sections comprising installations of not more than 50,000 and 30,000 kW. The exact locations cannot, of course, be mentioned, but a number of sites in the areas concerned that are suitable for relatively small stations can be called to mind. At the same time it is announced (though the two items are not necessarily associated) that the Ministry of Transport under the Emergency Powers (Defence) Act has authorised the Central Electricity Board to provide and operate generating stations. As the Board is not thereby relieved of the duty of satisfying the Electricity Commissioners that it is unable to arrange with authorised undertakings to operate such stations, the chief point in the Order would appear to be in the power given to the Board to find the money for providing them without trying to persuade a company or municipality to do so. This might be difficult in the circumstances as stations designed to serve war purposes might not be good commercial assets afterwards.

**Opening up the Jungle**

THE growth of the electrical industry in Malaya has been largely concerned with tin mining, principally in the valleys of the Kinta and Selangor rivers, with gold and coal mining on a smaller scale. The reduction in the tin export quota brought the production of electricity down from 521 million kWh in 1937 to 327 million kWh last year, but the outbreak of war caused a sudden increase in the demand for the metal and in the later months of the year electrical plant capacity was taxed to the utmost. Of late there have been signs of a more stable load being developed in Malaya. Electric cooking and water heating are coming into popular favour and air-conditioning equipment is in particular demand in a country where the atmosphere is uncomfortably humid for the European. Better lighting is also being provided in public buildings, shops and homes. Paths are being cut through the jungle to carry transmission lines to remote parts, while small oil-engine plants are being set up in small towns and villages. The F.M.S. looks largely to this country for its electrical plant and apparatus and should provide a growing market for our manufactures.

**Ability to Serve**

MR. LESLIE GAMAGE, Export Director of the General Electric Co., Ltd., contributed a special article to our Export Trade Number in March last in which he outlined means of improving our overseas trade. Among other things he urged that the Government should stipulate when purchasing raw materials from the Dominions that they should purchase goods from Great Britain in return. The article expressed confidence in the ability of British electrical manufacturers to meet the needs of their overseas customers. They asked for no subsidies, but required freedom from interference. In view of the possible influence of the article in export markets we are glad to see that a number of Dominion papers have reproduced it. We hope that it will have the effect of assuring buyers of electrical equipment that Great Britain can deliver the goods. In this same connection it is pleasing to read in the *Indian and Eastern Engineer* assurances by a number of leading British manufacturers that they are still able to serve the Indian market in spite of wartime difficulties.

**Waste Heat**

THE economical use of heat units that are available after a relatively small proportion has been taken for the production of power is feasible in more cases than is often supposed. The variety of methods is large, as a paper contributed to the *Journal* of the Institution of Heating and Ventilating Engineers for August by Mr. S. G. Saunders indicates. One method of heating is described which has an especial electrical interest. That is the use of automatically-switched immersion heaters to supplement the heat provided by the exhaust and jacket water of Diesel engines and at the same time to level the electrical load on the generator, by this means much more than doubling the overall efficiency of the unit. The system was, we believe, initiated by Mr. Pakenham Beatty at the Pinewood Studios, Bucks, some four years ago and was described in this journal at the time.

**Unsolicited Testimonial**

OUR friend "Janus" of the *Gas Times* is still castigating his industry for its hesitancy, secretiveness or whatever it is. Recently he held us up as a shining example, although he was good enough to spare our blushes by not mentioning us by name. His remarks ran as follows :—

> "Employing the test that an industry gets the sort of papers that it deserves, the gas industry should not be feeling too well pleased. Let anyone who thinks that is too severe a statement take a look at the electrical Press and he will have cause to wonder why the gas industry should at all times, but more particularly in war-time, be so secretive. Just take a recent issue of one electrical paper. This is devoted to lighting in war-time, and quite prominent people have found time to write articles on that subject. At the same time there is ample news of matters of general interest. On the gas side there is something near to a complete blackout, and this extends to its most active sphere—the industrial field."

# TRANSFORMERS IN INDUSTRY

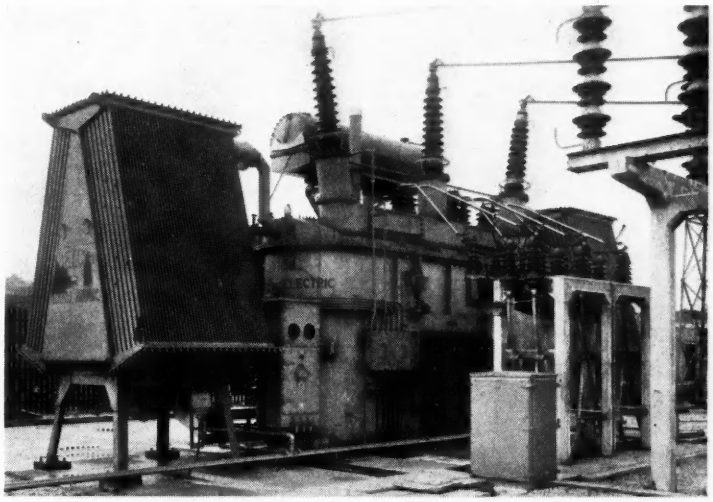
## Substantial designs and constructional precautions

FORTY-THREE years is a long period of time to devote to the making of one type of product. Such single-minded perseverance in purpose can have been sustained only by sound practice, representing the progressive application of an accumulation of manufacturing experience acquired through specialisation, culminating during the last eight years' association of the British Electric Transformer Co., Ltd., with Crompton Parkinson, Ltd., in the combination of two of the oldest names in British electrical industry.

It is barely five years since this concern claimed the distinction of "over 2,000,000 kVA for the grid," yet the average size of transformer manufactured in England does not exceed 300 kVA and this mean rating does not include any made below 5 kVA. So that spectacular though large power transformers may be, it is prudent always to remember that it is the medium to small industrial range of sizes, say from 1,500 down to 5 kVA, that is the mainstay of transformer makers in general.

In this respect it is worth bearing in mind that adaptability is one of the surest safeguards against changing circumstances, which reflection is prompted by the variety of types and sizes in which the air-cooled radial type continues to be demanded for industrial service. This observation might be surprising were it not for the recollection of the versatility of the original Berry design and the marked advantages claimed for it under certain conditions. For instance, operational silence is inherent in its make-up, an aspect that has lately become prominent; but a far more arresting claim commercially is that of the reduced fire risk which accompanies air cooling by comparison with any sort of oil-immersed equipment. The rate of heat dissipation by conduction assured by the preponderant mass of metal would hardly allow sufficiently high temperature to persist long enough for conflagration to occur, while there is simply not enough inflammable insulating material in the radial design to burn in the ordinary sense.

Plain air cooling is confidently recommended up to about 1,500 kVA and 6.6 kV, the larger three-phase sets generally consisting of three single-phase elements grouped in clover-leaf fashion within a triangular perforated metal casing to which cable boxes can be attached in the ordinary way. Nevertheless, first cost and the physical dimensions are admittedly smaller when designed for oil-immersion, cooled by natural circulation. For example, while radial transformers are manufactured for air cooling in sizes up to 500 kVA per phase they are now made for oil cooling in sizes up to 10,000 kVA per phase.

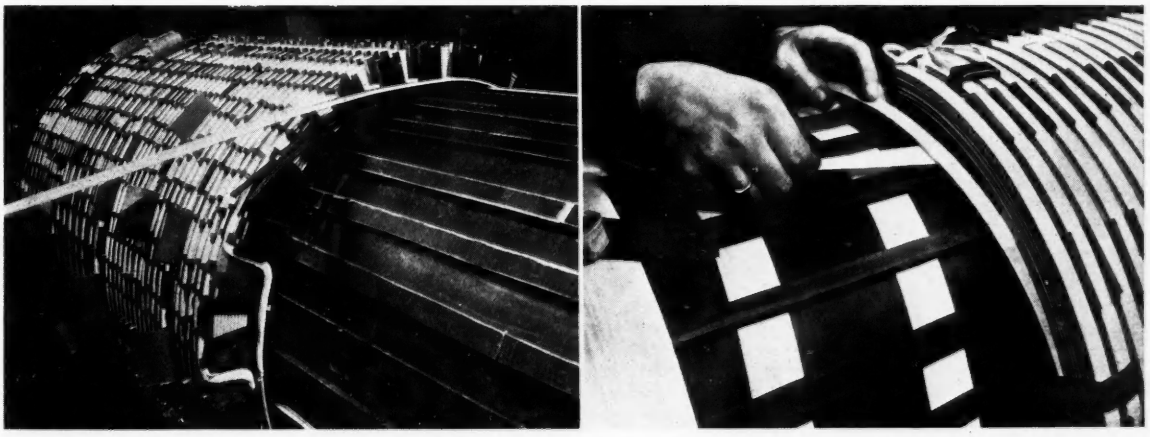


**Transformer supplied for the North-Western Area of the Central Electricity Board; 45-MVA, three-phase, 50-cycle 132/33-kV ON/OFB unit**

### Insulation Details

The difference between good and inferior constructional practice is largely one of detail; individually small, perhaps, but collectively tending to influence discriminative choice. The principal insulation of the copper conductors is pure manilla paper. The broad rolls are cut longitudinally by a machine capable of delivering at the same time several strips of differing widths. This operation is purposely undertaken at the Hayes factory to make sure that the edges are clean cut, otherwise the paper might be torn in passing through the tension block of the winding machines. The covering machines half-lap the paper in two layers, wound in reverse directions so that there are actually four layers of insulation. This method avoids interstices forming due to the conductor being bent or stretched when winding.

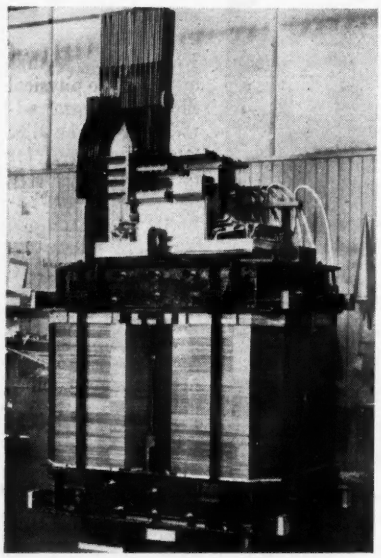
The B.E.T. Co. covers its own conductors and consequent advantages are that the Design Department has increased scope, is not restricted by limitations of lengths, types,



**Left: Pressboard cylinder on which the coils are wound, showing spacers and strips. Right: Taping crossovers and putting in pressboard inserts**

stock, or manufacturing time. If it is desired to grade the insulation along the conductor for a specific purpose it can readily be done without temptation to compromise or makeshift. Being self-dependent helps the company to maintain promised deliveries. When the size or design of the transformer requires it an extra serving of cotton is laid over the manilla paper for mechanical protection. Paper-covered conductors are used for smaller sizes of B.E.T. transformers than is the general practice, but for sizes too small for paper covering to be practicable a double cotton covering over an enamelled conductor is employed.

Argument on the comparative merits of pressboard and bakelite for the main insulation of transformers is pointless. Each has properties which suit it for particular duties in different positions within a transformer. Bakelite is used where its mechanical properties will serve the best purpose and "Elephantide" pressboard is utilised everywhere; it can be machined by ordinary tools and a valuable advantage is that when oil-impregnated it has a similar dielectric constant to oil itself, the higher dielectric constant of bakelite being considered under some conditions to render it less suitable as an insulator in contact with oil.



**OSW shell-type transformer completed, without tank; 4,000-kVA, single-phase, 50-cycle, 10,000/250-V, 400/16,000-A**

### Coil Windings

The several types of winding in use are referred to as spiral, crossover and continuous disc, respectively, the regard for service practice and small detail being indicated by the arrangement of the last-mentioned type of coil. The cylindrical former on which the coils are wound is made of pressboard formed with a scarfed joint. Over it are wedge-shaped strips of pressboard appropriately shaped to take the spacers which are dovetailed to slide freely on them. This arrangement makes it impossible for the spacers to work out in service and yet they are free to slide when the coils are tightened.

Where the first turn of a coil rises to the second layer, a length of conductor might be left unsupported and a sharp point of contact would then exist where the conductors meet. This would become a point of abrasion at which in course of time a short circuit might easily occur. A safeguard is the insertion of a tapered strip of pressboard so cut as gradually to raise the conductor, supporting it everywhere and avoiding a sharp point of contact. Joints are always potential sources of weakness, but to make coil windings continuous is often so very difficult that for certain windings it is not attempted. The company has succeeded in avoiding joints, even in double disc windings, whose conductors are wound alternatively outward (away from the cylinder) and then inward. This is done by first winding the inward-wound disc outwards like its neighbour, then collapsing it and reforming it as an inward winding; a skilful operation which has been done successfully at Hayes for years, the conductor being taken away from the *bottom* of the inward-wound coil to commence the next outward-wound coil. For extra insulation and mechanical protection the crossovers are carefully taped and, in addition, pressboard inserts separate crossovers from the coils.

Individual discs are separated by the dovetailed spacers which have been previously referred to, and these maintain the horizontal oil ducts. Further, the axial spacers provide generous oil ducts vertically and the whole arrangement is such that free circulation of the oil is promoted. In all cases care is taken to maintain a good ampere-turn balance over the tapping range, and with this end in view the centre discs may be considerably more widely spaced than the end ones corresponding to the tapped portion in the outer winding. An excellent feature of this type of winding is the extremely small amount of shrinkage in the coil stacks during the seasoning process.

The same form of winding is used to a large extent in the Berry radial type transformer, but with this type the coils are in many cases wound direct on the core over an insulating cylinder in order to ensure that the leads are brought out at the correct places. When the windings are completed they are removed from the core for treatment, after which they are reassembled on it and the outer iron circuit is filled in.

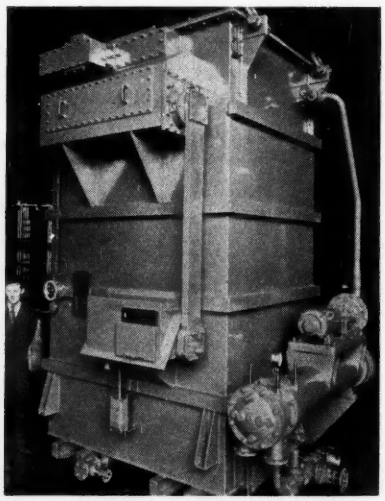
### Cores and Frames

All cores are made up of Sankey non-ageing silicon steel. The laminations are either "Insulined," or varnished, for minimising eddy current losses. They are cut from bulk and selected by gauge for thickness to ensure snug interleaving, which is one way of avoiding noise. Cores are taped only in sizes up to 100 kVA. Tie bolts are eliminated from all except the very largest sizes or special transformers, as the bolts may reduce the spacing between the windings and earth and so prevent the best practical arrangement of leads.

The company believes in rigidity, making the core and frame as a self-supporting single assembly, which will adequately bear the coils. The frames are of structural steel sections reinforced by gussets, and all this constructional fabrication is done wholly at Hayes, keeping busy a well-equipped machine shop that occupies the full length of one of the central bays of the factory.

### Tappings and Risers

Tappings from outside turns of a continuous disc winding are made of the same copper section as the winding conductor, being sweated on and insulated with pressboard and then taped overall. Tappings from inner turns are brought out by copper strip, which is taken round the conductor, both ends being brought out for connection to the copper riser. They are then insulated with pressboard and taped. All copper risers are tinned or otherwise treated to check any interaction that might induce sludging.



**Type OFW arc-furnace transformer for two- to three-phase output**

Grouped risers are consistently insulated throughout their length being supported and protected by pressboard wrappings or bakelite tubes. Wood is never used for high voltage clamping, because it is said to tend to "track" along the grain. Instead, either pressboard or metal with a bakelite tube is preferred. Low-voltage bars are supported by steel brackets from which they are insulated by pressboard separators. A bolt enclosed in a pressboard tube passes through the complete assembly. This construction is rigid and neat. The high-voltage risers are brought up to a link board from which nothing can become detached and be lost in the tank; the link is non-detachable and the nuts are split-pinned on to the studs for effecting quick alternative tapping.

B.E.T. tap-changing gear needs no introduction. The off-load type is of flexible design with standardised parts manufactured to jigs for consistency. The same size contacts are used for all currents, as they can be readily multiplied as required. They are tested to twenty-six times their normal rating; a single contact rated at 75 A is declared to be capable of carrying up to 2,000 A without burning. Off-circuit tap changers are generally mounted above the core of the transformer and the operating spindle is brought through to an external handle with a dial which shows the tapping in use.

Some thirty years ago the company was manufacturing on-load tap changers. Types SDA and MDA represent the latest development, in both of which a mercury switch in the form of a projecting tube above the diverter drum is used as the sparking contact, which makes the circuit in advance of the main contact and breaks it after the main contact has parted; therefore, there is no burning of the contacts, for the spark is taken wholly by the mercury. Since the latter is short-circuited in all running positions, the heavy current caused by a fault is carried by ordinary metal-to-metal contacts and so the mercury is not subjected to "pinch" effect.

An auto-transformer is always used for bridging and it is so designed that the full-load current can be carried through half of the winding continuously. A non-magnetic gap is included in the magnetic circuit to prevent any undue rise of voltage when the load current is flowing through the half-winding. The on-load gear can be supplied for manual operation or, alternatively, for remote control by push-button and for fully automatic control by voltage relay. Further, where two or more transformers are closely associated, parallel control can be arranged on the "master follow" principle.

### Tanks and External Fittings

Tanks are of all-welded construction, either plain or when extra cooling surface is necessary they are provided with tubes which can be either round or oval; also round tubes are sometimes provided with gills. The company has carried out considerable investigation into paint finishes for tanks to obtain a lasting anti-corrosion surface. Under and top coatings are supplied by the same paint manufacturers to be chemically compatible. The under-coatings are applied immediately the tank has been completed and cleaned and before any further corrosion can set in. The insides of the tanks are very carefully cleaned and finished by spraying with black enamel. Conservators are recommended where there is any risk of deleterious effect on the oil due to acid fumes or a very humid atmosphere.

Accessibility and convenience characterise the cable boxes, which are of a number of designs to suit various needs. For instance, one type has a separate oil-filled disconnecting chamber which enables electrical tests to be carried out on either the transformer or the cable without disturbing the main tank cover. All cable boxes have generous expansion chambers which function as convenient fillers. Terminal stems are pegged to prevent them turning when tightening up cable sockets; the oil gauges do not protrude, being of the flush window pattern and so are well protected. Any type of temperature gauge can be supplied, including a dial type indicating thermometer with an electrical alarm to warn against excessive heating. Calcium-chloride and silica-gel breathers are available according to preference.

### Types under Construction

Constructional uniformity is striking. Neat winding regularity extends down to small instrument transformers, both current and potential of most forms, including wound laboratory types down to 15 VA; a small step-down transformer combined with a switch-fuse in a cast-iron case for low-voltage safety lighting; and chokes for mercury vapour lamps for factory lighting. Power testing equipment is mounted on a high gallery for conveniently reaching over tall tanks. Power from the supply company's mains can be either taken direct, or transformed or converted by a variety of machines located in the Test Department sub-station.

South American purchasers have required 92/6.6 kV, three-phase, 60-cycle transformers of 16,500 kVA to be impulse tested before despatch, and the Public Works Department in New Zealand still demands that some of its transformers shall be plain water cooled. Examples are six of 8,000 kVA each to form 110/11 kV banks; another four at present in the Hayes factory are of 9,333 kVA each to form a 66/11 kV bank. All these have off-circuit tapping switches operated from ground level.

In addition, the C.E.B. is being supplied with two 20,000 kVA three-phase, 50-cycle transformers, ratio 66,000/22,000 V, and one 30,000 kVA three-phase transformer, ratio 66,000/6,900 V. All these are of the type ON/OFN. Further, there are two 10,000 kVA, three-phase, 50-cycle transformers, ratio 33,000/6,600 V for a northern corporation. All these transformers are fitted with B.E.T. type L.S. on-load tap changing gear, which incorporates diverter switches with drop-down tanks to facilitate inspection, while the auto balancers have been housed in a projection from the tank side so that the main and auxiliary coils are not in the same oil.

### Welding and Furnace Transformers

A contrasting case is that of automatic welding machines formerly served by water-cooled transformers which have since been replaced by an air-cooled type of 100 kVA, each with a single-turn secondary rated at 10,000 A. Another series of welding transformers was provided, to a customer's specification, with water-cooled connecting bars. For energising induction furnaces, when the transformer secondary loop constitutes the heating zone, the primary consists of a coil of tinned-copper strip wound edgewise and insulated with asbestos applied by puddling so as to withstand high temperature.

The company is supplying several transformers for arc furnaces employing 2/3-phase transformation. A typical equipment is one of 3,500 kVA, 2/3-phase, 50 cycles, ratio 7,000 V, two-phase/230V, three-phase. Tapped reactors are incorporated to bring the total reactance up to 30 per cent. A special arrangement of tappings on the transformer and the reactors is provided so that pre-selection of any transformer voltage tapping and reactor tapping is permissible. The tappings on the transformer windings enable voltages down to 85 V in ten steps to be obtained and the reactance is variable in 5 per cent. steps. A four-position motor-driven off-circuit tapping switch is provided and this is remotely controlled by push-button from the furnace control board. Electrical interlocks are also provided to ensure that the gear is not operated until the high-voltage circuit-breaker is open.

There are also a number of 4,000 kVA single-phase, 50-cycle furnace transformers, ratio 10,000/250 V. These are provided with tappings on the high voltage winding to vary the low voltage down to 90 V in 10 V steps, the range being covered in twenty steps by motor-operated on-load tap-changing gear of the type fitted to many transformers supplied to the grid. The control is by remote push-button. These transformers are also of the type OFW. A further order which is in hand is for a number of 10,120 kVA, single-phase, 50-cycle furnace transformers, ratio 33,000/220 V.

The company is manufacturing transformers for use in coal mines with or without associated flameproof switchgear. For the latter type it has supplied transformers up to 150 kVA, three-phase, 50 cycles, ratio 3,300/400 V. Reactors of diverse sorts and of substantial design are also produced.

## Flameproof Apparatus Specifications

A FRESH B.S.S., No. 889, for flameproof lighting fittings, covers well glass and bulkhead fittings intended for use where the following inflammable gases or vapours may occur in explosive mixture with air:—Group I: Methane. Group II: Petroleum vapour acetone vapour. Group III: Town's gas or coke oven gas containing not more than 60 per cent. hydrogen.

Portable headlamps connected to the circuit by flexible cord are not provided for in this specification. Such lamps are not at present accepted for certification by the testing authority. The dimensions are very carefully specified, and durability, hydraulic, impact and thermal shock, and temperature-rise tests are provided for. The flameproofness has to be in accordance with B.S. 229.

# PERSONAL AND SOCIAL

## Information regarding new appointments and other matters of interest for this page are welcomed

THE new chairman of the North Western Centre of the I.E.E., **Mr. B. G. Churcher,** was educated at St. Paul's School, London, and received his technical training at Manchester College of Technology. He served his apprenticeship with the British Westinghouse Co., on completion of which he joined the staff of the Transformer Department and was engaged on the investigation of insulation and transformer problems. He later took charge of the high-voltage insulation testing laboratory attached to the Transformer Department, the scope of which was extended. A few years later this laboratory and an existing chemical laboratory were brought together by Dr. A. P. M. Fleming to form the nucleus of what is now the Research Department of the Metropolitan-Vickers Electrical Co., Ltd. Mr. Churcher formed the electrical and magnetic section, which deals with research on problems relating to the Company's electrical products and on magnetic materials and dielectrics and with the development of special measuring instruments and testing equipments and was later succeeded in immediate charge by Dr. C. Dannatt.

Mr. Churcher also formed a section for the construction of instruments and experimental apparatus, to meet the needs of the whole department. A section for oscillograph and other testing services in connection with engineering development was also established and a laboratory, recently enlarged, was built in the works. In 1926 the problem of noise abatement in electric motors and other electrical and mechanical plant was referred to the Research Department, and under Mr. Churcher's direction the acoustics section was formed and an acoustics laboratory erected and enlarged in 1933. Since its inception, the section, under the supervision of Mr. A. J. King, has carried out research not only on practical problems of noise abatement but on fundamental problems of noise measurement and the laws of audition.

Mr. Churcher has contributed a number of papers on electrical and magnetic subjects and on noise measurement and abatement. He was invited to lecture on noise measurement before the American Institute of Electrical Engineers and the Acoustical Society of America in 1934. He represents the B.E.A.M.A. on the Acoustical Measurements Committee of the British Standards Institution, which has been instrumental in establishing the fundamental unit of noise measurement, the " phon," and was one of the British delegation to the International Acoustical Conference in Paris in 1937. Mr. Churcher received the honorary degree of M.Sc. from the University of Manchester this year.

Milford Haven Urban Electricity Department has appointed **Mr. A. Jolley** as mains foreman. Mr. Jolley has held a similar appointment with the Portland U.D.C. Electricity Department.

**Mr. H. G. Ward,** secretary of Rowlands Electrical Accessories, Ltd., has been appointed to the board of directors.

**Alderman J. H. Kearns, J.P.,** deputy chairman of the Salford Corporation Light, Heat and Power Committee, and area secretary of the Electrical Trades Union, has been appointed one of the five members of a new panel which will organise co-operative means of repairing rapidly any damage done by air-raids to factories engaged on essential war supplies. The full title of the new committee is the Manchester Area Panel of the Emergency Services Organisation.

**Mr. E. J. Vidler** has been appointed deputy sales manager of W. T. Henley's Telegraph Works Co., Ltd. Mr. Vidler joined Henley's in 1918 and became personal assistant to the sales manager (Mr. J. S. Bunting) in 1932. He was appointed assistant sales manager in 1937.

**Miss Caroline Haslett,** C.B.E., Director of the Electrical Association for Women, has undertaken to act in an advisory capacity on women's training for munition work for the Ministry of Labour and National Service. The scheme of training initiated by the Women's Engineering Society at the Beaufoy Institute, Lambeth, has been taken over by the Ministry for their first course of training and others will follow in due course. The E.A.W. is at present doing work of national importance in various ways throughout the country, particularly with the Ministry of Food, the Ministry of Information and also in the educational world. Miss Haslett will continue to direct the activities of the E.A.W.

**Mr. S. E. Bold,** Carron Company's sales engineer for the north-western counties, resigned his position in April last and now holds a commission in H.M. Forces.

**Sergt. Stanley Glazebrook,** who was on the staff of British Insulated Cables, Ltd., before joining the R.A.F., has been awarded the D.F.M. for his part in a successful bombing attack on the Dortmund-Ems Canal in Germany.

**Mr. C. S. Richards,** joint managing director of the Metropolitan Vickers Electrical Co., Ltd., is to be one of the members of the Economic Mission, which, as announced in our Commercial & Industrial News, the Marquess of Willingdon is to take to South America.

## Obituary

**Mr. M. Curran.**—The death occurred in Belfast on September 19th at the age of seventy, of Mr. Michael Curran, who founded the firm of Curran Brothers, electrical engineers, Belfast, over forty years ago. The firm became one of the best-known electrical concerns in Northern Ireland, where it has carried out some of the largest electrical contracting work, including street lighting in many towns and villages, among them being Portadown, Ballyclare, Newcastle, Portrush, Castlewellan and Whitehead. Mr. Curran was connected with a number of power stations before they were taken over by the Northern Ireland Electricity Supply Board some years ago.

**Mr. Charles William Victor Clarke,** whose death occurred on September 9th at the age of seventy-six years, was formerly with Willans and Robinson, of Thames Ditton, but later joined Ellis and Ward, Ltd., electrical engineers and contractors, with whom he served for forty-two years.

**Mr. William Dickens,** of Kirkheaton, Yorkshire, for many years secretary of T. W. Broadbent, Ltd., electrical engineers, Huddersfield, but who retired from the firm in 1932 owing to ill-health, died on September 22nd. He was in his seventieth year.

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# Steel Distribution Scheme

WHEN the first edition of the Steel Distribution Scheme was introduced five months ago, it was stated that there would necessarily be a trial period and the experience gained during that time would enable adjustments to be made for the more practical working of the scheme. These, together with provisions to deal with certain developments that have taken place, have now been incorporated in a revised simplified edition. The use of Department symbols, period numbers and Iron and Steel Control licences is retained. Symbols, which can only be authorised by a Government Department, and period numbers, with tonnages, must be quoted by all consumers of steel when placing orders with finished steel manufacturers. The symbol indicates which Government Department is responsible for an order, and the period number indicates the time during which the steel should be supplied. The Department contract or reference number will, in the new Scheme, be automatically included in the authorisation form which will be signed, on behalf of the Department, by the officer responsible for placing the order. A similar authorisation form will be used by the contractor in dealing with sub-contractors.

When there is no direct authorisation from a Government Department, a licence (which automatically includes a Board of Trade symbol) from the Iron and Steel Control is necessary. This, with the licence number, must then be quoted instead of the Department authorisation referred to above. Licences authorising the purchase of finished steel will be issued by the Iron and Steel Control for home civilian trade, direct export trade and stockholding merchants (or to replenish stock for home civilian trade, and direct export) and for repairs and maintenance in certain cases. A manufacturer who uses stock for the home civilian trade and for direct export, or a stockholding merchant, cannot replenish stock without an Iron and Steel Control licence.

Contractors and their suppliers who have obtained authority from a customer to quote a symbol, authorisation number and period number to acquire constructional steel, will note that this authority covers the aequisition only of constructional steel, and not the securing of the steel necessary to carry out the job. Supplies of finished steel for the stock of a structural engineer will be authorised only by Iron and Steel Control licence, and will in general be restricted to a maximum of 50 tons per month. Applications to acquire the steel from mills or a stockholding merchant must be submitted to the Iron and Steel Control on Form S.W. In the case of steelwork other than that for inclusion in a building, the raw material may be obtained from mills on the authority of a symbol, etc., without the necessity of the manufacturer or fatricator obtaining a licence from the Control. Private enterprise works of building or civil engineering construction, where the estimated cost exceeds £500, require a licence from the Commissioner of Works under the Defence (General) Regulation 56A, and application to use the " O.W." symbol for structural steelwork or other finished steel should be made to the local Licensing Officer of the Office of Works by whom the licence was issued.

No licence is required to purchase articles wholly or partly made from finished steel, but any manufacturer of such articles for the home civilian trade or direct export trade making a direct purchase of finished steel from a producer must first obtain a licence from the Control. Applications for licences must be made to the Iron and Steel Control by the person desiring to acquire the finished steel, except where the finished steel is required to fulfil a contract, in which case the main contractor must apply for a licence to cover his own requirements and those of any sub-contractors. In the case of indirect export, members of an Export Group should apply to the Group Secretary, who will obtain the necessary authority from the Board of Trade.

A contractor or sub-contractor using finished steel from his own stock to fulfil authorised orders may replenish such stock by quoting Department symbols, etc., on each order. In the case of a relatively small tonnage used to fulfil a large number of orders, it will not be necessary to furnish this detailed information. A booklet, " Distribution of Steel Supplies," is now being published, describing the revised scheme in detail. Application should be made to the Registry, Iron and Steel Control, Tothill Street, London, S.W.1.

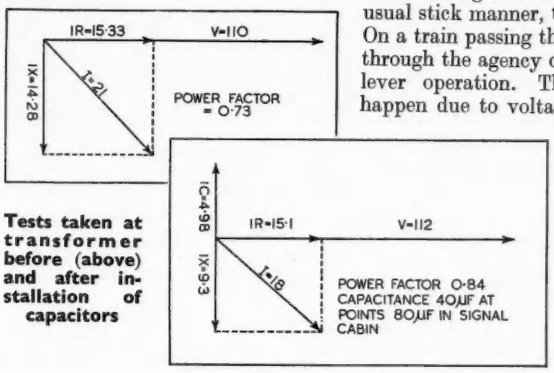
# RAILWAY SIGNAL MAINS

## Counteracting Voltage Drop

By H. C. Towers, A.M.I.E.E.*

ADVANTAGES gained by power factor improvement have been acknowledged for many years, relieving the burden on the source of supply. In some cases, such as small, widely distributed loads, while economy from power factor adjustment is desirable, the operating advantages which accrue from an improvement in distribution voltage and reduction in losses are of greater importance than the former consideration.

Such cases are found on railway signalling mains. Where power and automatic signalling are in extensive use it is necessary to run a signal main throughout the area to be supplied, and this main feeds track circuits, signals, signal cabins, point machines, &c. On an AC system (the standard practice to-day) the signal main voltage is maintained at 110 V at 50 cycles.



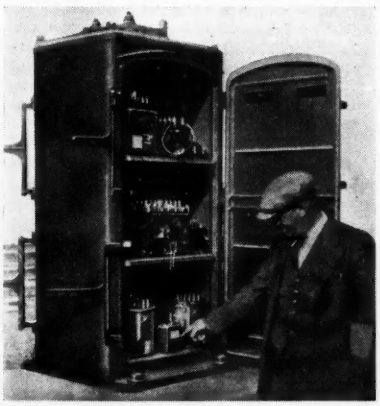

**Tests taken at transformer before (above) and after installation of capacitors**

Variations in the average load on the mains are slight. There is little difference in the current consumption of a track circuit whether occupied or not. The same remarks apply to a colour-light signal, since one aspect is always illuminated. Slight fluctuations are caused by the operation of signal and line relays.

The largest momentary load is taken where all-electric point machines are in use. Such a machine uses an AC series motor, which operates the point devices through a gear train. The motor is only in operation while the points are being changed and a load of from 9 to 12 A is imposed on the mains for a period of from 3 to 5 secs.

For voltage drop considerations, the machines are not operated direct from the signal cabin, but from a local transformer through a polarised point controller. The controller takes about 0.6 A and its polarity is reversed from the circuit controller on the point lever in the signal cabin. The conditions on the signal main are therefore a more or less constant load, with intermittent momentary loads, the imposition of which may cause several difficulties if adequate voltage drop allowance or compensation is not provided.

A practical example with which I was concerned will explain this point. At a certain station there were two mechanical signal cabins. Due to the introduction of automatic and colour-light signals it was found feasible to close one cabin, since the signals under its control were to be converted to colour-lights and could just as easily be worked by one cabin. Only three pairs of points were left, and it was decided to work these by all-electric machines controlled from the mechanical frame in the cabin.



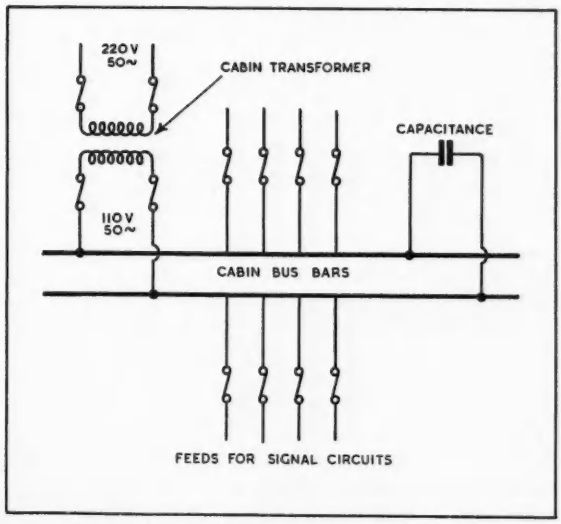
**Capacitor at signal location**

At this place the signal main was fed from a transformer at the station and, following a U-shaped course around the yard, terminated at the cabin. The point machines were fed from the centre of the "U" and the extra momentary load imposed by these machines caused a voltage fluctuation on the cabin bus-bars sufficient to drop the signal lock-stick relays.

It should be explained that this relay is employed to disengage a signal when passed by a train. It is picked up when the signal lever is reversed and held up, in the usual stick manner, through the track circuit control. On a train passing the signal, it is returned to danger, through the agency of the stick relay, independent of lever operation. The same thing was found to happen due to voltage fluctuation and as this could occur when a train was approaching, it was extremely undesirable.

There were three methods available for overcoming this trouble; to replace the signal main by one of larger section was not desirable on account of cost. Instead, voltage boosting transformers were temporarily employed until power factor improvement was effected. Fortunately, information was available regarding a capacitor specially designed for signalling requirements, which could be obtained in a variety of sizes. Capacitors of this type were installed and the difficulties were overcome. The improvement effected is shown in the vector diagrams.

The methods of applying capacitors to railway signal mains may briefly be explained as follows. One large capacitor may be installed at the supply transformer. This will improve the power factor at the point of supply, but will not alter the conditions on the line. A better arrangement is to employ a number of small capacitors distributed along the line. This will accomplish the same result at the point of supply and will also raise the power factor at the various points along the line, thereby decreasing the line current with a corresponding reduction in voltage drop.




**Voltage adjustment by capacitors**

Capacitors installed on new installations reduce installation costs, since they will enable the minimum sized transformers and smallest sized line wire to be used consistent with mechanical strength and permissible voltage drop.

* Signal Engineer, Bombay, Baroda and Central India Railway.

# Correspondence

*Every letter must be accompanied by the writer's name and address preferably, but not necessarily, for publication.*
*The Editors cannot accept responsibility for correspondents' opinions*

## Air-raid Shelter Wiring

THE letter from Mr. H. Moss in your issue of September 13th regarding dangerous wiring in air-raid shelters, particularly in the steel type, is interesting. It is quite possible to make a first-class job of the wiring, using the finest materials and complying with all the regulations only to have a bomb destroy sufficient of the wiring to convert the steel shelter into a live structure. Personally I play for safety by reducing the pressure to about 6V by means of a small transformer and using an automobile bulb. The mains are all in the house and all of the outside lines are at 6V only.

The problem now is that many people require heating and I have not yet found a satisfactory solution to it. Incidentally, an Anderson shelter properly sunk is quite a good earth on average test with a continuity test meter. I naturally condemn the practice of using a small heater with two-core flex slung from a bedroom window; this is probably the type of installation to which Mr. Moss referred. The public now purchase shoddy materials at multiple stores and do work in keeping with those materials. In the absence of periodical inspections by the supply authorities they will continue to do so. The radio-set building boom some time ago made the public dangerously confident of their electrical knowledge.

I endorse the suggestion made by Mr. Moss that all wiring materials should be inspected and sold to contractors and public only when they have been passed as satisfactory by the testing authority.

Our local paper this week advises people to purchase small electric stoves for use in outside air-raid shelters. Following upon recent correspondence from contractors it tells its readers not to do the installation work themselves but get competent contractors to do it. What is actually happening, however, is that the public is buying the cheapest type of fire with two-core flex and plugging it into a lampholder.

*September 26th*, 1940. WIREMAN AND WARDEN.

## Evacuation and Hire-purchase

With reference to the I.M.E.A.'s transfer scheme as summarised in your September 13th issue, may I suggest an alternative which may be more acceptable both to the evacuation and reception undertakings, namely:—

(1) Apparatus to remain the property of the undertaking, as at present until the instalment payments are completed.

(2) Evacuee consumer to pay the cost of, and be responsible for, transport of apparatus to the reception district.

(3) Undertaking in the reception district to connect the apparatus, carrying out any wiring necessary at the consumer's expense.

(4) Servicing to be carried out by the reception undertaking, and if the h.p. agreement covers free maintenance, charging the cost to the undertaking owning the apparatus, at net cost.

(5) Reception undertaking to collect h.p. instalments and refund them to the owner undertaking.

The advantages claimed for this scheme are as follows:—

(*a*) Apparatus may be taken and used by the consumer in any part of the country for the duration of the war, and afterwards may be brought back, without changing the ownership, and without terminating the h.p. agreement.

(*b*) The owner undertaking, by being charged for any maintenance at net cost, will presumably incur no more expense than if the maintenance were carried out by the undertaking's own staff.

(*c*) The apparatus will in all probability be far safer in the reception district, and difficulties of storing, etc., will be avoided.

(*d*) The hirer will benefit from the use of the apparatus and should be willing to continue the h.p. payments. The reception undertaking will benefit from the sale of electricity, and the small amount of servicing will be amply repaid.

(*e*) No change of ownership having taken place, the reception undertaking will not be obliged to purchase the apparatus, and the difficulty of raising money in these times will be avoided.

The above scheme is put forward as a suggestion; modifications may be necessary, but the principal advantage aimed at is simplicity and encouragement to the consumer to use apparatus which may otherwise be merely stored for the duration of the war.

Bridport, *Sept. 26th*, 1940. E. W. FAITHFULL, A.M.I.E.E.

# Protection in Factories

## Minimising Danger to Workers

THE Ministry of Home Security has issued Air Raid Precautions Memorandum No. 16, "Emergency Protection in Factories" (Stationery Office, price 1d.). This is primarily designed to show how protection can be improvised for workers who continue at work after the sounding of a public air raid warning, but the measures recommended are also applicable to meet the case of bombs falling in an area without previous warning.

In the first place it is emphasised that the effects of direct hits are not always so disastrous as is imagined. The extent of the damage depends largely, of course, upon the size of the bomb, but the effects of even the largest are often surprisingly small. There is evidence that in the case of a multi-storey building in which all loads are carried by steel or reinforced concrete frames, the damage caused by even a direct hit will be local and will be confined in most cases to the floor and bay which is hit. In other multi-storey structures protective conditions are not so favourable.

Dealing with the causes of casualties, the Memorandum gives them as glass splinters, bomb fragments, blast and other debris. Shelters which comply with the Code (Air Raid Shelters for Persons Working in Factories, Mines and Commercial Buildings) provide protection against these dangers. It may not be possible for employees to reach these shelters in time but various degrees of reasonable protection can be improvised in the shops for factory operatives.

### Methods Generally Applicable

Each type of building presents its own problems but suggestions are made which are generally applicable. Although usually it will be impracticable to bring the lateral protection afforded up to the Code standard, lesser standards, e.g., a 9-in. thick wall, will provide a reasonable measure of emergency protection. Additional lateral protection may be provided by traverse walls, dividing up the floor area as much as is practicable. These walls need not be more than about 2 ft. 6 in. above floor level if the personnel is trained to lie on the floor during an attack, although, of course, higher walls give greater protection. In some cases low walls could be built behind the workers' positions at the bench or row of machines and it might be possible to use them for stacking articles produced instead of placing them on the floor.

In many cases the machines themselves will provide lateral protection and heavy products may be stacked to form traverse walls. The protection of window and door openings must not be overlooked. Pits and sub-floor ducts provide excellent lateral protection and might be extended where it is at all feasible.

It is virtually impossible to protect a steel-framed single-storey shed building, but measures can be taken to protect against glass splinters and other debris. Methods of protecting factory glazing are set out in an appendix; they include hessian-bitumen treatment, the use of wire netting, the blocking of window openings and the provision of asbestos sheeting for vertical windows.

As has been said, multi-storey steel or reinforced concrete framed buildings are inherently resistant to air attack and, with very little alteration, can be made to conform to Code standard. Multi-storey buildings with masonry walls should have the floors supported by means of piers or additional walls. The roofs of other single-storey buildings should be given additional support.

### Protecting Services

It is important that special steps shall be taken to protect vital services—water, electricity and gas—and essential machinery. Attention should be paid to the duplication or re-arrangement of services to ensure that complete stoppage is not caused by one bomb. All vital plant, including in particular electrical equipment such as switchgear and transformers, should be protected against blast and splinters by the provision of traverse walls and, if possible, by covering them with a substantial roof.

Special attention should be paid to effective fire watching, and measures should be taken for the protection of highly inflammable materials which are a danger to surrounding property. If large stores of such materials cannot be protected, they should be broken up into smaller lots.

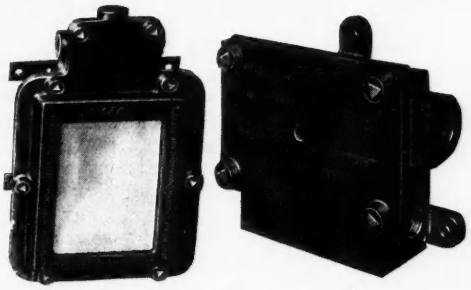
The Appendix draws attention to the importance of having a stock of materials for repairing damage to glazing, such as tarpaulins, bituminous sheeting, asbestos-cement sheets, cellulose-acetate sheet, timber and corrugated sheet steel.

# NEW ELECTRICAL PRODUCTS

## A Review of Equipment Recently Marketed

### Flameproof Conduit Fittings

A TERMINATING box for connecting conduit entering an inflammable atmosphere from a non-inflammable atmosphere or *vice versa* has been produced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. It has passed the Group II and III tests and examinations of the Mines Department testing station, and is designed to withstand, without injury, a maximum internal pressure of 80 lb. per sq. in.



G.E.C. bulkhead garage lighting fitting and (right) conduit terminating box

The rectangular cast-iron casing is extended on one side to form a standard conduit box, and is completed by a recessed cast-iron cover. Insulated terminal stems project through the partition wall into the integral standard conduit box. The terminating box is provided with two conduit bosses, the unused entry being closed by a recessed plug.

It is to be noted that the other end of the conduit away from the box must terminate in a flameproof enclosure, and only heavy-gauge, solid-drawn conduit to B.S.S. 31, or gas-quality tubing to B.S.S. 789, solid-drawn or with butt-welded joints, should be used. The conduit is secured by a locknut.

A bulkhead garage lighting fitting, also for use in inflammable gaseous situations, is a flameproof version of the existing G.E.C. garage fitting, but meets more stringent requirements. It is particularly suitable for installation in the base of garage repair pits where it will provide an adequate upward light. Buxton certificates Nos. I and II have been granted to it by the Mines Department.

The lamp enclosure is a cast-iron casing with an armour-plate glass window cemented with litharge and glycerine into a cast-iron retaining ring, the window being secured by a bezel. Insulated terminal stems project through the casing into the integral terminal box, which is completed by an extension of the retaining ring. A detachable cable sealing box for wire-armoured cables is screwed into the terminal box, unused (alternative) cable apertures being closed by screwed plugs. Individual window glasses are pressure-tested up to 100 lb. per sq. in., and replacements are only supplied cemented into the cast-iron retaining ring.

The fitting can be used with lamps of up to 150 W except in cellulose vapour where, to comply with requirements as regards maximum temperature, a lamp of not more than 60 W should be used.

### High-pressure Pumps

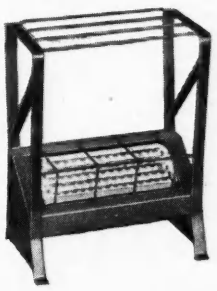
Horizontal motor-driven pumps of the enclosed single-acting pattern with a 2-in. stroke are offered by WORTHINGTON-SIMPSON, LTD., Newark-on-Trent, for any service involving small quantities of water at high pressure. For example, they will deliver a high-velocity jet for washing purposes, and are also suitable for feeding small boilers. They are useful to filter manufacturers, water purification engineers, and on any service where a definite quantity of fluid at high pressure is to be injected. These "Triplex" machines are built in lots of 100, in order to reduce production costs, and the following are the main features of design.

They have totally enclosed crankcases, with self-oiling, dust-proof power end, holding a liberal supply of oil. The main bearings are of large area and the whole of the driving parts in the crankcase can be easily and quickly withdrawn in one assembly for inspection or replacements by removing the crankcase cover and unbolting the main bearings. Oil-leak preventers are fitted where the plungers pass through the crankcase, and deflectors midway between the power end and pump end prevent water or oil creeping along the plungers. The maximum working pressure is 350 lb. per sq. in. and the maximum pump speed is 300 RPM. Three plunger sizes can be fitted, $\frac{1}{2}$ in., $\frac{5}{8}$ in. or $\frac{13}{16}$ in., so that the $\frac{1}{4}$ in. by 2 in. pump will deliver from 20 to 65 gallons per hour, according to speed, the size of motor being $\frac{1}{2}$ BHP.

### Domestic Appliances

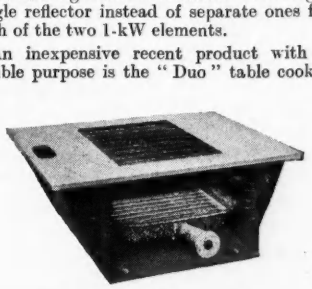
The winter season is being commenced by BELLING & CO., LTD., Southbury Road, Enfield, Middx., with good stocks of practically all their products, though some of the older fires will not be repeated when present limited stocks have been exhausted.

Four fresh models include the inexpensive "Standby," which is a wartime product for emergency purposes. A kettle can be boiled on the 1-kW horizontal firebar, while food and plates can be kept hot on a grid above. The finish is copper-bronze, as is that of the low-priced parabolic reflector model listed as the "Reflex" in 750-W and 1- and 2-kW sizes. An advantage of the "Camp Fire" is that, being double-sided, it projects heat in opposite directions. Wire guards at the sides and on top enable toast to be made and plates of food to be kept hot, or a kettle can be boiled with the radiator tipped on its side, each 1-kW element being separately switched. The "New Country" is similar to an existing model but is fitted with a larger single reflector instead of separate ones for each of the two 1-kW elements.



The "Standby" fire

An inexpensive recent product with a double purpose is the "Duo" table cooker which, although primarily intended for preparing breakfasts and light meals in small homes, or for emergency purposes, can also be tipped up on end and used as a fire. Its weight is 12 lb., the grill chamber being 9 in. wide, 10 in. deep and $4\frac{1}{2}$ in. high, with a mottled green hob on a black base.



The "Duo" table cooker

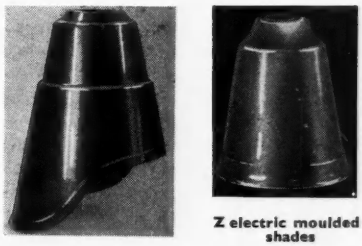
A fryer for fish, potatoes, fritters, etc., newly designed for canteens and restaurants, is made of heavy-gauge sheet-steel, which is vitreous enamelled, with a nickel-plated pan and rim. The pan, which is removable for cleaning, takes 6 lb. of fat or 5 pints of oil which will boil in 20 minutes at 4 kW. Smaller loadings can be had to order for use off 15-A plug points.

Another new appliance is arranged for, but not restricted to, the frying of bacon and eggs; the cooking space is 12 in. by $13\frac{1}{2}$ in. by $1\frac{1}{4}$ in. deep, there being six egg compartments. The heating elements of both these rectangular fryers are standard multi-parabola fire-bars wound with heavy-gauge nickel-chromium wire. Connections at the back are made suitable for a three-heat switch mounted separately.

### Moulded Shades

An inexpensive range of moulded shades offered by Z ELECTRIC LAMP & SUPPLIES CO., LTD., 21, Newman Street, London, W.1, covers both A.R.P. and ordinary lighting needs. For industrial uses these shades provide local illumination under black-out conditions and when suitably arranged they are said to give adequate lighting to meet the new recommendations for factories.

There is also likely to be a large demand for domestic purposes, for which the coloured types are to be preferred since they give a brighter touch during the daytime. The translucent material used in making the shades for ordinary lighting is particularly attractive, delivers a light of high intensity, and is non-inflammable, the colours (black, blue, green and orange) being permanent and washable. Two sizes are available suitable for up to 100- and 200-W lamps respectively.



Z electric moulded shades

### Motor Starter

A motor starter which is claimed to be of definitely fresh design is announced by FRED. W. DAVIES & SON, Longroyd Bridge, Huddersfield, Yorks. It is designated "Type S" and is of the oil-immersed, star-delta pattern, being simple and positively direct acting. The usual features of no-voltage release, overload trips, correct sequence device and "stop" push-button are provided.

Component parts are readily accessible for inspection and renewal, there is no unnecessary complication or crowding of the mechanism, yet the starter as a whole is of compact and pleasing design, all working parts being entirely enclosed. It is understood that the makers are in a position to supply these starters in limited quantities from stock in sizes up to 20 BHP.

### Immersion Heater for Water Bottles

For maintaining the temperature of rubber hot-water bottles without having periodically to refill them with hot water, L. G. HAWKINS & CO., LTD., 30, Drury Lane, London, W.C.2, have made available a rod-type immersion heater which will fit into the majority of rubber water bottles. It is simply screwed tightly in place of the ordinary stopper, and the loading is purposely low to avoid risk of overheating, yet it is claimed to be sufficient to keep the bottle comfortably warm for 100 hours for a consumption of 1 kWh. All metal parts which might be touched when in use are rubber-covered

# RECTIFIERS FOR PLATING

## Economy and Efficiency

By A. G. Arend

ONE of the results of emergency conditions is that the desire to economise in electricity consumption has become more acute, and all kinds of measures are already under consideration to reduce industrial demands to the minimum. In the ordinary course of electro-plating the motor-generator set tends to be accepted as an essential feature of the layout, since it has hitherto been considered the most efficient plant for furnishing DC.

This factor has been somewhat over-rated so far as the usual job plating room is concerned, since there is no definite amount of current which can be said to be required for lengthy periods at a time. When, for example, several thousands of spoons have to be plated, the work is so completely systematised that the exact amount of current, without wastage, is utilised. But such perfect conditions cannot be maintained when each separate bath is engaged on a different job, since the voltage necessary has to be varied to suit in each case. One bath may be engaged on modern chromium plating, while nickel and copper plating may be carried out in others, so that excessive voltage may be " thrown away." By segregation of the loads, and energising the baths through rectifiers, the efficiency of the whole can be raised to its highest figure.

The reason for this improvement when a large number of different voltages are in use is that the latter can be adjusted by altering transformer ratios, not wasted in heating grid rheostats, so that in actual practice the rectifier can often supersede the motor-generator. It is not intended to suggest that the rectifier can always supplant the generator set, but rather to supplement it, and thus secure better current efficiency. The power factor of the rectifier is practically unity.

Charts and graphs can be made to represent the volt-ampere curves of single plates, from which voltage regulation can be estimated, except for changes in resistance which occur with changes in rectifier temperature. As the curves are generally parallel, the smallest percentage regulation accordingly occurs at the highest voltage, and 6V is the usual limit of output obtainable from a single plate in series. When a steady 6V is required the motor-generator will be seen to advantage, but below this figure, little difference in efficiency exists, and for a wide variety of voltages the rectifier shows best results.

### Many Advantages

As rectifier plates are susceptible to corrosive atmospheres, the rectifier cannot be mounted in the plating room, unless it is specially equipped with a ventilating system, but the need for this precaution applies equally to the generator set. This ventilating system represents the only moving part connected with the rectifier layout, so that little maintenance or repair work is necessary. Other advantages of the rectifier are that it is completely metallic and dry, silent, free from glass or easily broken parts, with nothing that can wear out. In large plating shops a rectifier can be easily operated by remote control, there is no time lag during operation, and it can carry full load instantly at any time, on the application of voltage.

As regards adjusting the output, a customary method is to use a transformer with taps in its primary winding ; thus by means of fine and coarse taps a large number of steps is made available. For example, a ten-point dial switch may be used in conjunction with three coarse taps, so that although the adjustment varies in passing from maximum to minimum values, there is only a quarter volt which can be vitiated. In large plating shops it is often desirable to adjust voltages while the power is on, but dial switch and tap arrangements are not normally made for this contingency. Only a few seconds of time are lost, but in many of the modern plating processes this is important, particularly for the latest colour tinting methods. It may also be desired to make adjustment in steps smaller than those initially anticipated. By use of a suitable three-phase regulating transformer, *i.e.*, an auto-transformer in conjunction with the rectifier transformer, smooth adjustment over a wide operating range is obtained. In order to ensure that this adjustment will satisfy all conditions, suitable cooling must be maintained.

Cooling fans soon proved that the gain which resulted was insufficient to justify the expenditure, but changes in the manufacture of the rectifier itself, whereby the size of the elements could individually be increased to almost any degree, made this provision unnecessary. Plate rectifiers do not require pressure, because of a spraying process which is performed on the current collecting surfaces, of what is a non-corroding alloy. Many plate rectifiers are ventilated by forced draught.

Both disc and plate rectifiers of equivalent areas have the same characteristics since current will flow in either direction at normal room temperatures, at any voltage. But when delivering load there is some voltage drop within the rectifier itself, which affects its efficiency, and the latter is also influenced by the smaller current which flows in the back direction through each plate during that part of the cycle when it is not actually carrying load.

### Application to Modern Methods

In view of the recent developments of cadmium-plating, coloured chromium-plating, and plating with the rarer metals, it would appear that a still greater call is likely to be made in the near future on this industry, and accordingly it behoves all interested to appreciate the most economical methods of setting up the plant. Many of the smaller electro-platers simply connect the AC mains directly to a small rectifier, and thus obtain sufficient DC for the plating of miniature bolts, nuts and screws, the rectifiers used being of the small disc type assembled as a 3–4W trickle charger.

Nowadays, however, trickle chargers capable of delivering the thousands of amperes necessary for a series of electrolytic baths are available. The disc type is frequently alluded to as the pressure type, because of the method of assembling individual discs by stacking on insulated bolts. The various sections, which include radiating fins, soft lead washers, and spacing washers, etc., are clamped together under great pressure, but this system of manufacture tends to limit dimensions as similar pressure cannot be applied to extensive plates or be uniformly distributed over the surface. The plate type does not necessitate any pressure treatment at the concluding stages of manufacture and hence all sizes can be turned out.

When utilising melted-down scrap metals and similar " waste " materials the much higher grade of recovered product nowadays expected can be achieved by electrolytic methods of refining. But when an electro-plating concern is offered the opportunity to refine metals the risk of unduly losing voltage becomes a serious one, particularly where power is obtained from a generator set only. Where rectifiers are also available plating work can be carried on as usual, while other baths may be devoted to the refining process by simply segregating the respective loads.

Small rectifiers have recently been introduced for the electro-refining of silver and other precious metals, as they are convenient for the small space which is devoted to this special work. The plating of spark-plug tips also calls for small compact equipment.

Under emergency conditions it is possible that current supply from the mains might be restricted unexpectedly. A motor-generator does not make provision for this contingency. The only thing to do would be to stop the work, and cut out so many of the baths as would enable the desired distribution to be maintained to the remainder, which would occupy time. With a rectifier this change can be made almost instantly, without undue loss, and a change back to normal can be made with equal rapidity.

# COMMERCIAL and INDUSTRIAL NEWS

## Building Control. London Companies Join J.I.C. South American Trade.

### Overseas Trade in August

THE Board of Trade returns of our overseas trade during August show that as a whole there was a rise of 17.2 per cent. in imports as compared with August, 1939, and a fall of 12.2 per cent. in exports. There was a substantial improvement in exports of electrical goods—from £935,000 to £1,299,000—but the value of machinery exported fell from £3,963,000 to £3,333,000. For the first eight months of the year the total value of electrical goods exported was £9,837,000, as compared with £8,289,000 in the corresponding period of 1939. On the other hand, machinery exports declined from £36,070,000 to £27,856,000 in the same period. Imports of machinery were higher both during August and in the first eight months of the year.

### Australian Electrical Imports

Preliminary statistics of Australian overseas trade during 1939–40 show that imports of electrical machinery and appliances in that period totalled £4,393,000 in value as compared with £4,913,000 in 1938–39. The largest item was cable and wire valued at £1,421,000, an increase of £186,000. Dynamo-electric machines totalled £721,000 (£88,000 decrease), telegraph and telephone material £702,000 (£359,000 decrease), lamps £208,000 (£34,000 increase), batteries and accumulators £65,000 (£24,000 increase) and unspecified goods £1,276,000 (£316,000 decrease).

### Factory Watchers

The Minister of Home Security has made an Order under the Defence Regulations providing that a fire watcher shall be present at all times in all premises in which more than 30 persons work. This Order applies in addition to any premises, whether or not more than 30 persons work therein, the whole or any part of which is used as a warehouse of greater capacity than 50,000 cu. ft., and any saw mill or timber yard containing more than 50,000 cu. ft. of timber. The Order does not apply to a warehouse when it is empty or to premises which form part of any mine or quarry. During the period in which a hostile attack is in progress in the vicinity, or an air-raid warning is in operation, the person who has undertaken to act as fire watcher must be in readiness to attack an outbreak of fire and summon assistance, and to use such fire fighting appliances as may be available. The person responsible under the Order for seeing that it is carried out, is the occupier of the premises. Any two or more occupiers of different parts of the same premises may arrange to provide one fire watcher for the whole building.

Arrangements have now been made for the training of instructors, who will then conduct local courses for factory watchers in each Civil Defence Region. It is intended that the arrangements for these courses should be made locally and employers are requested not to make applications for their watchers to be trained unless and until such applications are invited. No time will be lost in setting the local courses on foot. Meanwhile, schemes for working after the sirens should be carried forward with the best watchers available.

### Control of Building

It was announced last week that an Order was being issued, to take effect from October 7th, stipulating that no work of building or civil engineering construction may be undertaken without consent from the appropriate authorities in order to conserve labour and materials urgently needed for war purposes. The Order will not affect contracts where the estimated cost does not exceed £500; where the work is being done on behalf of, or under contract with, a Government Department, or where a Government Department has agreed to pay all or part of the cost; where the work is being done by a local authority in discharge of its functions under the Civil Defence Acts; or where the work is in the nature of maintenance, running repairs or decoration. Copies of an explanatory memorandum which has been prepared and circulated to local authorities, architects, builders, contractors, etc., can be obtained from the Licensing Officer, H.M. Office of Works, Abell House, John Islip Street, London, S.W.1. Consent will usually take the form of a licence issued by the Office of Works. In the case of certain building or constructional operations carried out by local authorities, highway authorities, public utility companies, and of operations in connection with mining and quarrying,

**The attractive 1940-41 "Cosmos" calendar**

consent will take the form of an authorisation issued by the appropriate department. Applications for consent to continue operations already in progress, where the estimated cost of completion exceeds £500, must be made not later than October 21st.

### E.D.A. Aids

In our last issue we referred to the possibility of lights coming on in "un-blacked-out" rooms when a coin is inserted in a meter after the supply has been exhausted. To counter this the British Electrical Development Association has produced a little disc for sticking on prepayment meters warning consumers to be sure that no lights have been left switched on before putting a coin in. These discs have already been purchased in large quantities by supply undertakings; the price is 5s. per thousand. E.D.A. has also produced an economy label for sealing envelopes. This bears small illustrations of women using an electric iron and a cooker, with the inscription "Saves Time, Trouble, Labour." These, too, cost 5s. per thousand.

### E.P.E.A. Tuition Scheme

At the outbreak of war the Electrical Power Engineers' Association had to consider whether it should suspend its correspondence tuition scheme for the duration of hostilities. It was realised on the one hand that there were likely to be difficulties owing to the depletion of the head office staff and on account of the demand for tuition diminishing considerably as a result of many young engineers being called up. On the other hand it was felt that if the facilities for tuition were not available, some young engineers might be deprived of the opportunity of improving their technical knowledge and of passing examinations vital to their careers. It was finally decided to carry on and the results of the past year have fully justified the decision. The number of young engineers called up has been less than was expected and many students have been enrolled. The standard of attainment is considered to be higher than usual and many successes have been gained by the students.

### I.E.S. Meetings

The Illuminating Engineering Society has provisionally arranged the following meetings for the autumn:—October 8th. Open meeting. Presidential address by Professor J. T. MacGregor Morris entitled "The Arc as a Standard of Light." (To be held at the Royal Institution, 21, Albemarle Street, London, W.1.) October 22nd. Paper by Mr. H. C. Weston on "Wartime Industrial Lighting." (To be held at the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.) December 10th. Demonstrations of the effect of contrast in illuminating engineering, at the E.L.M.A. Lighting Service Bureau. Further meetings are in prospect in 1941, when Dr. W. D. Wright is to read a paper on "Vision in Very Weak Light" (January 14th) and Mr. J. G. Holmes is to deal with "The Recognition of Coloured Light Sources" (February 11th). A series of meetings has also been arranged by the local centres.

### Auto-Electrical Technicians

The Association of Auto-Electrical Technicians, Ltd., was registered September 25th, as a company limited by guarantee, without share capital. The original number of members is 1,000, each member being liable for £1 in the event of winding up. The objects are to promote the arts, sciences, standards and engineering and electrical practices connected with the design, construction, utilisation, maintenance and servicing of automotive electrical apparatus for all forms of self-propelled media for the transportation of passengers or freight, &c.

The subscribers are: Thos. J. Sack, A.M.I.E.E., 90, Hillway, Highgate, N.6, and six others. The management is vested in a Council. Until the first general meeting the subscribers, and such other members, if any, as they shall co-opt are to form the Council. The Secretary is Mr. C. C. Feldman, and the registered office is at 84, Northumberland Road, New Barnet.

### Westland Repair Organisation

The Westland Repair Organisation, Ltd., was registered on September 23rd as a company limited by guarantee, without share capital. For the purposes of registration the number of members is declared to be 50. In the event of the company winding up each member is liable for a sum not exceeding £1; and John Brown & Co., Ltd., and Associated Electrical Industries, Ltd. (if still members), each undertake to contribute such additional amounts as may be required, not exceeding on the part of John Brown & Co., Ltd., £3,500, and on the part of Associated Electrical Industries, Ltd., £1,500. The objects are: To undertake the supervision and management of repairs to and the recovery of salvage from aircraft manufactured in Great Britain or elsewhere, and to enter into an agreement, dated August 27th, 1940, and made between John Brown & Co., Ltd., and Associated Electrical Industries, Ltd. (on behalf of this company), and Westland Aircraft, Ltd.

The directors are: T. H. Burleigh, address not stated; E. Mensforth, Westland Works,

Yeovil (managing director of Westland Aircraft, Ltd.); T. Mensforth, Crown House, W.C.2 (managing director of the Hotpoint Co.); S. W. Rawson, 8, The Sanctuary, S.W.1 (director of John Brown & Co., Ltd.); and Lt.-Col. Wyndham Lucas Sorel, D.S.O., 57, St. James's Court, S.W.1. Solicitors: Reney & Co., 42/5, New Broad Street, E.C.2.

### London Companies join N.J.I.C.

The London electricity supply companies have now become members of the Joint Industrial Council for the Electricity Supply Industry. In commenting upon their decision, the *Electrical Power Engineer* says that many of the London companies were formerly members of the Council but they severed their connection about the time of the general strike and for some years they have stayed outside the Industrial Council machinery, though they have continued to conform to the D.J.I.C. schedules. Our contemporary goes on to say: "The amount of useful work which has been done by the Council has, no doubt, impressed them, particularly that in connection with the Schedule of Reserved Occupations and they have probably felt that it was neither to their benefit nor to that of the industry that they should hold themselves aloof from the good work which was being performed. Their return will be welcomed, and it is to be hoped that this will prove the precursor to the next step, namely their membership of the National Joint Board. When all the London companies have joined, the organisation will be practically complete, as there will be only two or three undertakings outside. A little persuasion ought to be sufficient to bring them in and, if that is successful, the C.E.B. will alone remain. There is reason to believe that even this citadel will at last succumb."

Reference is made to the article in the ELECTRICAL REVIEW of August 30th in which Mr. A. H. Banks, Employers' Industrial Adviser, showed that the Conditions of Employment and National Arbitration Order has brought into being a new order of things in which Industrial Councils are destined to play a vital part. It therefore becomes a problem for serious consideration as to whether or not any employers can, with propriety, remain outside their industrial organisation.

### Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable Making Industry announces that the cost-of-living figure on September 1st (87 per cent. above the 1914 level), will not involve any alteration in wages on the third pay-day in October.

### Fuel Oil Burner Export Group

Member firms of the British Oil Burner Manufacturers' Association, who specialise in the manufacture and application of oil burning equipment, have formed the Fuel Oil Burner Export Group under the export scheme fostered by the Board of Trade. Mr. W. A. Hubbard (Combustions, Ltd.) is to be the chairman, and Mr. J. S. Greenhalgh (Babcock & Wilcox, Ltd.) is one of the members of the Executive Committee. The secretary of the Group is Mr. Stanley Henderson, whose offices are at 69, Cannon Street, E.C.4 (telephone: City 4444). One of the objects of the newly formed Group is to develop overseas markets from which Germany and the countries occupied by German forces are cut off. Arrangements have been made to give special attention to the requirements of markets in the Dominions, Palestine, Egypt, Iraq, Iran, Portugal, the Dutch East Indies and the Far East.

### Trade with South America

The Government has decided to send a special mission to South America as part of the British trade drive. The mission will be under the leadership of Lord Willingdon and will include representatives of important industrial and export interests. The names of these representatives and the commodity with which they are principally associated are as follows:—Sir Walrond Sinclair (rubber), Sir Granville Gibson, M.P. (leather), Sir Ernest Johnson (pottery), Sir Kenneth Lee (cotton), Mr. J. A. Burns (coal), Mr. Herbert Hey (wool), Mr. H. McGill (textile machinery), Mr. H. S. Mackintosh (paint), Mr. C. S. Richards (electrical goods), and Sir Jonah Walker-Smith, M.P. (constructional industries).

The mission will leave in the middle of October and among other countries will visit Brazil, Uruguay, Argentina, Chile, Peru and Bolivia. It will seek to discover methods to knit together more closely our trade relations with South America. It will develop the already large export trade with South America and try to replace the goods previously exported from Europe but now non-available owing to the blockade. A development is on foot in Argentina where it is hoped to start an arrangement to enable British goods to be sent out on consignment. This means that large stocks will be held in Argentina and will avoid any delays owing to shipping. This will be a half-way house between the British vendor and the South American trader. Arrangements are also being made for an exhibition of British goods in the principal cities of South America.

An important aspect of the mission is that it has the sympathy of the United States Government. The United States is Britain's principal trade competitor in South America, but the objects of the mission have been explained to the U.S. Government and have its approval and sympathy. The secretary-general of the mission is Mr. S. G. Irving, formerly Commercial Counsellor at Buenos Aires.

### Ample Coal Stocks

According to the *Western Mail* between 22,000,000 and 24,000,000 tons of coal are now in stock in this country as reserves to meet the needs of industry, public utilities and domestic users, and the reserves are being steadily increased. The lesson of last winter with regard to coal supplies has been learnt and the railways, factories and gas and electricity undertakings would be able to carry on from their reserves for many weeks, and these reserves are in addition to the pithead stocks.

Since the loss of important European markets the main concern of the Mines Department has not been production but the organisation of distribution in such a way as to secure the maximum flow of supplies in the event of local and temporary dislocations of transport services.

### Killed Mending Iron

A verdict of "Death by Misadventure" was recorded at a recent inquest at Redcar on Russell Edward Edgar, aged eighteen, who was fatally injured by electric shock while mending an electric iron. An employee of the Redcar Electricity Department said that the flexible cord was wrongly connected, making the iron alive when the switch was closed. In his opinion the whole installation in the shed where deceased was working was an extension to the house installation.

### Damages against Cable Company

Before Judge Archer, K.C., at Brighton County Court recently, Callender's Cable & Construction Co., Ltd., were the defendants in an action brought on behalf of a four-and-a-half years' old girl, Ray Francis, who put her foot into a small bowl of molten solder in St. John's Road, Hove, while work was in progress on the change-over from DC to AC. Negligence was alleged which defendants denied, alternatively pleading contributory negligence on the part of the child.

For the child's parents it was stated that nobody was in attendance at the crucial time, and the metal was not roped off or guarded in any way. The little girl was attracted to the bowl, which with the sun shining on it looked alluring. After putting her foot into the metal she ran home screaming. Her sandal was taken off, with the metal solidified in the shape of her foot. She was placed under a general anæsthetic at Hove Hospital and two days later developed scarlet fever. Fortunately she made a good recovery and beyond rather a bad scar the only difficulty was her nervous condition. Dr. V. I. Claxton said he considered that the accident would be past history in a few years and that the child would become normal. For defendants it was stated that the foreman in charge shouted to the girl probably almost at the same time as her foot penetrated the metal.

The Judge said he had no difficulty about the question of liability—dangerous things could not be left about in that way—but how could he assess damages for pain and suffering? After discussing the matter with counsel he awarded £100 damages to be brought into court; £50 had already been paid in.

### Appeal in Ulster Action for Damages

Last June, in the Ulster King's Bench, Mr. Justice Brown dismissed an action for damages brought against the Antrim Electricity Supply Co., Donegall Square, Belfast (ELEC. REV., June 28th, page 690). The plaintiff was James Joseph M'Laughlin, aged twelve, who sued through his father. The boy sustained a severe electric shock when he climbed a pylon at Fair Hill, Maghera, and negligence was alleged in the erection and control of the pylon. Mr. Justice Brown, dismissing the case, held that plaintiff was a trespasser, but fixed damages at £232 in the event of a successful appeal.

The case recently went to the Ulster Court of Appeal before the Lord Chief Justice and Lord Justices Babington and Murphy. Appellant's counsel argued that the boy was a licensee, or alternatively that it did not matter whether he was a trespasser or not. Respondents ought to have known from the condition of the place at the monthly inspections that children played on the ground around the pylon. The Judge had held that the boy was guilty of contributory negligence, but counsel contended that only if the boy had appreciated the danger when he climbed the pylon could there have been contributory negligence. Counsel for respondents submitted that the Judge's finding was correct and that the boy was clearly a trespasser. The pylon had been there for three years without anyone being harmed. The contributory negligence was the boy climbing the pole when he had no right to. The Court reserved judgment.

### New National Scrap Survey

A comprehensive national survey to assess and record all the bigger sources of potential scrap metal in Britain is announced by the Minister of Supply. The survey will cover every condemned bridge and derelict building, every abandoned mine and quarry. It will include disused steel towers, mine and railway tracks and every large structure now no longer in use but which, because it contains valuable iron and steel, would yield scrap metal.

### Catalogues Required

Electrical Installations, Ltd., 65, Vincent Square, Westminster, London, S.W.1, asks all manufacturers who have in the past supplied them with goods to send them two copies of their price lists and catalogues.

### Change of Address

Our contemporary *Electrical Industries* has removed to Cordwallis Works, Cordwallis Road, Maidenhead, Berks. (Telephone: Maidenhead 326).

### Trade Announcement

The Metropolitan-Vickers Electrical Co., Ltd., informs us that all inquiries and orders relating to instruments, meters, relays, etc., formerly sent to the Meter Department at 25, Gorst Road, Park Royal Road, London, N.W.10, should in future be addressed to the head office of the company, 1, Kingsway, London, W.C.2.

### Catalogues and Lists

**Hanovia, Ltd.**, Slough.—A booklet entitled "Fitness in Industry, and its Maintenance by Indoor Sunbaths," in which is given instructions for planning a welfare solarium in factories, mines, &c., with a collection of facts from experiences of employers in many branches of industry.

**Jackson Electric Stove Co., Ltd.**, 143, Sloane Street, London, S.W.1.—A catalogue containing illustrated particulars and prices of electric fires.

# TECHNICAL TRAINING

## Is it sufficiently Practical?

By E. B. Watton, A.M.I.E.E.

IN an article published in the ELECTRICAL REVIEW, of January 19th, Professor R. O. Kapp postulated a shortage of trained engineering students at the end of two or three years, assuming that the war continues for that period. On the other hand, the end of the war will doubtless see a boom in technical education corresponding to that of 1918-19. Educational authorities might well occupy the intervening time considering whether they really do give value for money.

Many will, no doubt, consider it gross impertinence to talk about value for money in the same breath as education. The academic mind frequently affects a contempt for such sordid commercialism, with the consequence that students are allowed to complete their courses under the impression that in their degree or diploma they possess a first-class passport which will open all doors. Later they find that their training is, so to speak, merely a season ticket which, while admitting them to the platform without the need to stand in a queue at the booking office, does not guarantee even standing room on the train. Those who have expected their tickets, for which they paid so much, to entitle them to a seat, find it distasteful to enter a struggle, and let many trains go by before they realise their mistake.

The trouble with most forms of technical training is that they tend towards the inculcation of a great deal of knowledge which is probably only required by a man who reaches the upper branches of the tree. By the time the aspiring graduate reaches a position where that knowledge would be useful, he has probably forgotten it.

### Too Academic

Is the training received sufficiently practical? In my opinion, it is not. It is far too academic, and students work in a kind of rarefied atmosphere, divorced from reality. In a great many institutions the staff may not have had much contact with the work of the outside world for twenty years, during which the curriculum has remained unchanged. For mechanical drawing, the same old cast-iron bearing block is in use and sections are laboriously drawn, the same groups of students carry out thermal efficiency tests on the same old asthmatic reciprocating steam engine.

"Design" classes are held, in which great importance is attached to accuracy of calculations and theory, and none whatever to cost reduction, ease of production and other important practical points. Few headaches will be caused, commercially, if the calculated efficiency of a small motor is 81.25 instead of 81.3 per cent., but if the castings cannot be made and the bolts are either three times or one-third their proper size, or one component requires five machining operations instead of two, in a commercial firm someone is going to be very unkind in his comments.

The answer given to most critics of educational institutions is that an engineering course, even if it does not completely cover the ground, is extremely valuable as a form of mind-training. So, for that matter, is a course of reading for the Bar.

A student has the right to expect more than a course in mental gymnastics in return for his fees; he is entitled to expect that he will be given such training as will enable him to take his place in the engineering world with the minimum of shock, friction, or lost motion. In particular he should, throughout his course, have some definite aim as to his subsequent movements. Few students have this. They are allowed to complete their course in complete ignorance of the "set-up" of the engineering world, and the opportunities therein; they do not know what they are aiming at.

### Specialisation Necessary

Many students complete their course with only the vague notion that they are learning to be "engineers," their horizon being their final examinations. Beyond that, they are pathetically convinced that "something is sure to turn up." So it may—a tester's job, perhaps, at thirty-five shillings a week, or an opening for a very junior draughtsman. What more can they expect? Their training is usually not nearly as valuable to their potential employers as a little experience would be, and so they lose many jobs to people who, lacking the advantages of education, went to work at an earlier age and have acquired that experience. True, the better trained man will have a good chance of passing the others in the race in later life, but the discovery that he is not a finished product, as he has been led to believe, but merely raw material for the next process is apt to be a blow to the young graduate.

What is the remedy? Is it not a little extra specialisation? Is not the accepted theory that no student should specialise until he has had a thorough grounding in engineering fundamentals due for a revision? With the tremendous increase in specialisation in the last two decades, is it still desirable that educational authorities should insist on that "fundamental training" occupying the major part of an engineering course? If the colleges guaranteed to find each student a satisfactory position at the end of his training, on a "no-job-no-fees" basis we should see some radical changes in their curricula.

If, then, it can be agreed that some form of specialisation is necessary, what form should it take, and when should it begin? In my opinion it should start from the first day of the course. A regular weekly lecture (substituted for, say one of the mathematics classes) should deal with engineering organisation. It should cover every branch of engineering, and should describe in detail the various positions open in any particular branch, the approximate salary payable and the method of approach. It would show which are blind-alley jobs, carrying a comparatively attractive commencing salary, and which would be worth working for during a long period under bad conditions for an ultimate prize. It would be, in short, a complete guide to the student's after-life, but it would probably be the most difficult lecture to deliver successfully. By the end of his first year a student would have a fairly accurate idea of his future course and his studies could be directed with that end in view, with specialised training replacing certain redundant subjects.

### Refresher Courses

Another step in the right direction would be an insistence upon the teaching staff keeping up-to-date in their particular subjects. The Board of Education has done a certain amount in this direction with its Summer School, held annually since 1921, but this is hardly enough, since the period is short (about one week) and the number attending (about one hundred) not nearly large enough. Work in this direction has been carried out by some of the large manufacturers, but their efforts, although valuable, are but a drop in the bucket. A co-operative effort by manufacturers would be to their own ultimate advantage.

College holidays are comparatively long. Is it too much to ask the faculty to take refresher courses in industry in order to ensure their being abreast of the latest developments? Or is teaching still to be regarded as it was fifty years ago, as a quiet backwater, remote from the hurly-burly of the rabble, where a man can, on the strength of academic degrees, continue to deliver the same course to successive generations of students, without regard to the enormous strides made in the outside world?

The above suggestions, coupled with an extension of vacation employment and "sandwich course" schemes for the students themselves, are offered to the responsible parties for their consideration during the period between now and the return of the world to normal living, bearing in mind that competition will probably be very much keener then than we have ever known it before. Judiciously applied, they should save many heartbreaks on the part of the young men about to carve out careers for themselves.

No amount of ideal training will produce "trained engineers." It will never produce anything but the raw material for the engineering world. But it could, at least, produce graded raw material, fit for processing, with the minimum of unnecessary machining, idle time and waste.

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## Measuring Self-inductance

A DUAL bridge for the measurement of self-inductance in terms of resistance and time is described by H. L. Curtis and L. W. Hartman (President University of Nevada) in Research Paper 1310 issued by the U.S. National Bureau of Standards. After developing the theory, the authors give some experimental results. The dual bridge consists of a primary bridge and a detector bridge, both of which are independently balanced for continuous current. The primary bridge has the inductance to be measured in one of its resistance arms and a source of unidirectional pulsating current in its battery arm. In its galvanometer arm there is connected, through a rectifying switch, the detector bridge which has an integrating galvanometer in one of its resistance arms and a battery as a source of current. The current from the battery is adjusted until its effect on the integrating galvanometer is equal and opposite to that of the pulses of current from the primary bridge.

The theory not only gives the formula for computing the inductance, but also a formula for determining the maximum number of pulses per second that may be employed with a given set of bridge constants in order to obtain a desired accuracy. The experimental results show that the method can readily be used to measure inductances as large as 1 henry with an accuracy of 1 part in 1,000.. There are indications that results of much higher accuracy can be obtained.

# ELECTRICITY SUPPLY

## Islington Superannuation Decision. Southend Finances. Midland Towns Retain "Starlighting"

**Bromley.**—STREET LIGHTING.—The Corporation Highways Committee recommends approval of the revised proposals of the borough engineer with regard to the provision of modified lighting.

**Clitheroe.**—PURCHASE OF UNDERTAKING.—The Electricity Committee has approved terms for the purchase of the electricity undertaking at Gisburn, owned by Mr. J. H. Tattersall.

**Croydon.**—LOAN FOR EQUIPMENT.—Sanction has been obtained by the Electricity Committee to borrow £1,785 for substation equipment.

**Fleetwood.**—CHARGES UNALTERED.—It has been decided not to make any change in electricity charges or for the hire-purchase of apparatus.

**Grimsby.**—LOANS.—The Electricity Committee is seeking sanction to borrow £4,933 for mains and services, £1,000 for meters, £1,000 for hired apparatus and £960 for substation equipment.

**Inverness.**—SMALL PROFIT.—The gross income of the Electricity Department for the past year was £43,650 and there was a net profit of £653. In order to meet increased charges in respect of coal, &c., and higher labour costs, it is necessary to increase certain charges.

**Leicester.**—SHADED LAMPS.—In order to allay what are described as "unfounded fears" the Street Lighting Department proposes to shade all "starlight" street lamps about which complaints have been made on the side of the building from which the light is said to be reflected. So far 174 lamps have been dealt with out of a total of 4,818.

**London.**—RECOVERY OF SUPERANNUATION EXPENDITURE.—The Islington Electricity Committee reports that for some time past the town clerk and borough treasurer have been in communication with the London and Home Counties Joint Electricity Authority with regard to the recovery from that Authority of certain costs incurred by the Council under the Local Government Superannuation Act, 1937, in respect of employees on the generation side of the undertaking. Under the bulk supply agreement the amount to be paid by the J.E.A. to the Council for electricity supplied is calculated under certain headings, including "wages." The Authority contended that, inasmuch as no item in respect of superannuation was included in the agreement, no expense in respect thereof was recoverable by the Council. Representations were made to the Authority that although superannuation was now effected under the provision of the Act of 1937, and no item under that Act was included in the basic figures incorporated in the agreement, there was included in those figures the cost of allowances made by the Council under the Superannuation (Metropolis) Act, 1866, and to that extent, therefore, the contention of the Authority was not correct. As no further employees would be superannuated under the Act of 1866, the Authority would be entirely relieved from the cost it had borne in the past when the time arrived at which these allowances would terminate owing to the decease of the employees concerned.

These representations being without result, counsel's opinion was obtained. It was obvious, in the opinion of counsel, that various heads in the first schedule to the agreement showed categories of expenditure and not actual amounts and, when examining details from which the amounts were made up, it was ascertained that under "wages" was included the whole cost to the Council of superannuation. In counsel's view, therefore, the Islington Borough Council was entitled to be repaid by the Authority the annual cost to them of superannuation in respect of workmen engaged in generation, even though there was now a compulsory superannuation scheme, and the form of expenditure incurred by the Council was slightly different in that it consisted of payments to a fund, out of which the superannuation allowances would ultimately be met.

The Central Electricity Board thus subsequently agreed that the charges in dispute should be included in the amounts of expenditure rendered by the Council to the Joint Electricity Authority for reimbursement under the terms of the agreement, and the effect of this to the Council will be a saving of approximately £1,000 a year.

**Melksham.**—STREET LIGHTING.—When the question of discontinuing the modified street lighting was raised Councillor P. Hughes, chairman of the U.D.C., expressed the opinion that controlled lighting with official approval was better than uncontrolled lighting by hundreds of torches, which created a real danger.

**Midlands.**—CONTINUANCE OF "STARLIGHTING."—In some towns modified lighting has been suspended as it is feared that the illumination may be visible from the air. At Birmingham, Walsall and Wolverhampton, however, the lighting is being maintained. Alderman M. L. Lancaster, chairman of the Birmingham Public Works Committee, recently stated that he did not think the Ministry of Home Security would ask for the installations to be extended if they were a source of danger. Mr. T. A. G. Margary, city electrical engineer of Wolverhampton, has expressed the view that the lights are absolutely safe and invisible from the air.

**Richmond (Yorks).**—PROPOSED STREET LIGHTING. — The Roads Committee is arranging to introduce modified street lighting.

**Southend-on-Sea.**—UNDERTAKING'S FINANCES.—At a recent meeting of the Town Council Alderman S. F. Johnson, chairman of the Electricity Committee, said that in regard to the borough electrical engineer's annual report the Council had come out as well as could have been expected, especially when the increase from 15s. 2d. to 32s. 6d. in the price per ton of coal was taken into consideration. The deficit of £30,000 should be compared with the increased expenditure, and it would be seen that the Department had fulfilled its work. The chairman informed the Committee that he and the borough electrical engineer had discussed with representatives of the C.E.B. the possibility of some reduction being made in the amount payable by the Corporation for bulk supply. The Board's representatives pointed out that very considerable expenditure had had to be incurred by the C.E.B. during recent years to meet the increased demand of the borough, and that in the circumstances the Board was unable to make any concession. It was resolved to take no action at the present time to revise the electricity tariffs now in operation in the borough.

**Walton & Weybridge.**—SHELTER LIGHTING.—At a recent meeting of the Urban District Council it was reported that in view of further expense being necessary to augment the battery lighting system, in addition to a considerable maintenance charge, it had been decided to connect public shelters to the electric mains.

**Yorkshire.**—INTEREST-FREE LOAN TO GOVERNMENT.—The Yorkshire Electric Power Co., Ltd., and Electrical Distribution of Yorkshire, Ltd., have lent £20,000 and £10,000, respectively, free of interest, to the Government as a contribution to the recent Leeds War Weapons Week which raised £3¼ million.

### Overseas

**Canada.**—DAYLIGHT SAVING.—It is estimated that 189,000 HP per day will be released for industrial power purposes as a result of an Order in Council passed by the Federal Cabinet decreeing that all communities which have been on daylight saving time during the past summer shall continue thus indefinitely. The Ottawa correspondent of *The Times* states that the decision has been taken on the recommendation of the Federal Controller of Electric Power with the approval of the Hydro-Electric Commission of Ontario and the private power companies of Quebec, two provinces where the demands of war industries are already straining the available power resources.

**Eire.**—CRITICISMS OF BOARD'S CHARGES.—The charges for electricity in Eire were criticised at a recent conference of municipal authorities at Dundalk. Mr. T. J. McInerney, town clerk of Kilkee, said that a householder now paid 18s. to 21s. every two months to the electricity Supply Board, where he formerly paid 6s. to 8s. to a local undertaking. Councillor Casey said that in Limerick a few miles away from where the electricity was generated they had to pay 25 per cent. more than in Dublin.

Mr. E. A. Lawler, replying to the criticisms on behalf of the Electricity Supply Board, points out that the services of the Board were extended to Kilkee in April, 1938, at the request of the Town Commissioners and townspeople. Prior to this the electricity supply was obtained from the local electricity company. In its last year of trading the local company sold 23,538 kWh in Kilkee for a revenue of £1,075. In the financial year ended March last, two years later, the Electricity Supply Board sold 217,288 kWh in Kilkee, for which it received a revenue of £1,937.

## Obligation to Supply

### Removal on Account of War Damage

AN Order made by the Minister of Transport under the Defence (General) Regulations releases electricity undertakings from their obligation to provide a supply in the event of plant receiving war damage (damage caused by, or in repelling, enemy action, or by measures taken to avoid the spreading of the consequences of damage caused by, or in repelling, enemy action).

The Order provides that where any public utility undertakers, being undertakers for the supply of electricity, are unable during any period to maintain a normal supply of electricity owing to war damage either to their own undertaking or to any other undertaking from which they derive, directly or indirectly, a supply of electricity in bulk, they shall not by virtue of any provision of any Act or other instrument determining their functions (other than a direction given in pursuance of the Defence (General) Regulations) be under an obligation to give and continue to give during that period a supply of electricity to any person or for any premises.

## New Generating Stations

TWO Extension Schemes, both dated September 18th, have been prepared by the Electricity Commissioners and transmitted to the Central Electricity Board under Section 4 (5) of the Electricity (Supply) Act, 1926 (Stationery Office, 1d. each). The first of these modifies the South East England Electricity Scheme 1927, as altered in 1936 and in 1939, by providing that the new generating station specified in the Appendix to the Scheme shall be a selected station, the first section of which shall have a capacity not exceeding 50,000 kW. The second of the Schemes modifies the South West England and South Wales Electricity Scheme, 1930, as altered in 1934 and 1939, by providing that the new generating station specified in the second Appendix shall be a selected station, the first section of which shall have a capacity not exceeding 30,000 kW.

# NEW PATENTS

## Electrical Specifications Recently Published

*The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.*

### 1938

30223. "Metallurgic furnace." H. L. Gentil. January 14th, 1938. (525709.)

35398. "Record-card-controlled computing machines." L. Mellersh-Jackson (Addressograph-Multigraph Corporation). December 5th, 1938. (Addition to 496994.) (525955.)

35427. "Processes for the manufacture of polarising materials." International Polaroid Corporation. December 4th, 1937. (525956.)

### 1939

2529. "Circuits for generating deflecting waveforms for cathode-ray tubes." Telefunken Ges. für Drahtlose Telegraphie. January 26th, 1938. (Addition to 483999.) (525680.)

2586. "Time-recording apparatus." Chronomatic (Time Control), Ltd., and C. P. Ekin. January 25th, 1939. (525681.)

3324. "Temperature regulators." L. Satchwell. January 31st, 1939. (525821.)

3568. "Resonant lines for high-frequency electric circuits." Marconi's Wireless Telegraph Co., Ltd. February 2nd, 1938. (525882.)

3613. "Treatment of boiler-flue gases." Simon-Carves, Ltd., and J. H. Leigh. February 3rd,1939. (525883.)

6123. "Television transmitting and receiving systems." H. E. Kallmann. February 24th, 1939. (525628.)

6124. "Television systems." Telefunken Ges. für Drahtlose Telegraphie. February 25th, 1938. (525629.)

6130. "Electric switches for alternating current circuits." G. H. Scholes & Co., Ltd., G. H. Scholes and F. J. Pearce. February 24th, 1939. (525592.)

6133. "Reflector fittings for electric lamps." Veritys, Ltd., and F. E. Chapman. February 24th, 1939. (525632.)

6144. "Electrical apparatus for indicating the conditions in the cylinders of internal-combustion engines." D. Napier & Son, Ltd., and F. R. F. Ramsay. February 24th, 1939. (525635.)

6156. "Electric cables intended for operation at carrier-current frequencies." Pirelli-General Cable Works, Ltd., and R. E. S. Soper. February 24th, 1939 (Cognate application, 11073/39). (525637.)

6192. "Speed control of textile machines driven by electric motors." British Thomson-Houston Co., Ltd. February 25th, 1938. (525644.)

6214. "Dry-contact electric rectifiers." Standard Telephones and Cables, Ltd. March 8th, 1938. (525652.)

6219. "Electric welding apparatus." W. J. Tennant (American Coach & Body Co.). February 24th, 1939. (525653.)

6220. "Protective arrangements suitable for use in mine-signalling systems." Automatic Telephone & Electric Co., Ltd., and W. Saville. February 24th, 1939. (525654.)

6239. "Magneto-strictive oscillators." Electroacustic Ges. March 28th, 1938. (525661.)

6267. "Fluorescent screens." S. T. Henderson and E. W. Fogg. February 25th, 1939. (525684.)

6278. "Liquid and vapour separators." British Thomson-Houston Co., Ltd. February 25th, 1938. (525669.)

6283. "Electrical condensers." Telefunken Ges. für Drahtlose Telegraphie. February 25th, 1938. (525672.)

6300. "Electric measuring instruments." S. R. Wilkins and Automatic Coil Winder and Electrical Equipment Co., Ltd. February 25th, 1939. (525690.)

6303. "Device for stripping insulation from electric cables and wires." H. St. J. C. Anderson, and F. G. Emley. February 25th, 1939. (525691.)

6351. "Generators for cyclically-varying currents or potentials." Telefunken Ges. für Drahtlose Telegraphie. February 25th, 1938. (525701.)

6354. "Cooling towers." O. H. Hosking and K. W. Branczik. February 27th, 1939. (Cognate application 11564/39.) (525702.)

6376. "Means for the control of spot welding." Austin Motor Co., Ltd. and W. L. Miles. February 27th, 1939. (525707.)

6383. "Electric-battery lamps for use in surgical and like examination." R. Grinton and J. Smith & Son (Glasgow), Ltd. February 27th, 1939. (525710.)

6408. "Remote control of radio receivers and the like." Philco Radio & Television Corporation. March 14th, 1938. (525722.)

6409. "Electric motor control systems." Westinghouse Electric International Co. February 26th, 1938. (525723.)

6411. "Fluid-pressure servomotor systems for governing prime movers." Westinghouse Electric International Co. March 2nd, 1938. (525724.)

6445. "Compressed-air operated high potential switches." Hundt & Weber Ges. February 28th, 1938. (525731.)

6468. "Manufacture of electric resistance material." Aktiebolaget Kanthal. February 25th, 1938. (525517.)

6473. "Automatic or semi-automatic telephone systems." Fides Ges. für die Verwaltung und Verwertung von Gewerblichen Schutzrechten. February 26th, 1938. (525741.)

6496. "Ceiling and other electric switches operated by a chain or pull member." G. Turnock, Ltd., and W. E. Taylor. February 28th, 1939. (525749.)

6538. "Electric contacts." A. Reyrolle & Co., Ltd., A. Allan, J. Small, and W. Anderson. February 28th, 1939. (525754.)

6545. "Sound recording." Radio Corporation of America. February 28th, 1938. (Adition to 500,994.) (525755.)

6553. "Electron multiplier arrangements." Kolster-Brandes, Ltd., W. A. Beatty and P. K. Chatterjea. February 28th, 1939. (525758.)

6554. "Radio and television receivers." Kolster-Brandes, Ltd., and D. S. B. Shannon. February 28th, 1939. (525826.)

6563. "Apparatus for melting lead and other metals." British Insulated Cables, Ltd., and S. Taylor. February 28th, 1939. (525884.)

6564. "Electric cables." C. J. Beaver, E. L. Davey and W. T. Glover & Co., Ltd. February 28th, 1939. (525762.)

6567. "Methods of insulating electric conductors." British Thomson-Houston Co., Ltd. March 1st, 1938. (525764.)

6591. "Switches for light railways." G. Bischoff and F. Nieberding. February 28th, 1938. (525771.)

6592. "Thermionic electrodes." General Electric Co., Ltd., and V. J. Francis. February 28th, 1939. (525772.)

6626. "Electromagnetic relays." Electro Methods, Ltd. (J. Schmidt). February 28th, 1939. (525779.)

6666. "Bushes for the cases of electric-circuit fittings." Midland Electric Manufacturing Co., Ltd., and A. W. Vicary. March 1st, 1939. (525788.)

6673. "Television and like systems, and apparatus therefor." Baird Television, Ltd. and G. A. R. Tomes. March 1st, 1939. (525791.)

6701. "Tuning devices for wireless receivers." General Electric Co., Ltd., and F. R. Jones. March 1st, 1939. (525829.)

6702. "Electric secondary battery systems." General Electric Co., Ltd., and H. Randall. March 1st, 1939. (525797.)

6707. "Electric hand torches or the like." D. M. Peill. March 1st, 1939. (525830.)

6713. "Load-limiting flash-control systems for electric ranges and the like." Proctor and Schwartz, Inc. March 7th, 1938. (525799.)

6717. "Manufacture of embedded electric heating elements." English Electric Co., Ltd. (Elektro-Gerätebau Ges.). March 1st, 1939. (525831.)

6718. "Means for controlling electric vehicles." English Electric Co., Ltd., H. S. Pound-Corner, P. L. Mardis, and H. B. Sedgfield. March 1st, 1939. (525832.)

6735. "Methods of sealing metal to quartz or vitreous material." British Thomson-Houston Co., Ltd., L. J. Davies, H. Cheney, H. K. Bourne and E. J. G. Beeson. March 1st, 1939. (525965.)

6736. "Gas-blast electric switches." British Thomson-Houston Co., Ltd. March 1st, 1938. (525835.)

6743. "Pipe line protection." Okonite-Callender Cable Co., Inc. March 10th, 1938. (525837.)

6763. "Electrical signalling systems." Automatic Telephone & Electric Co., Ltd., and J. F. Mackenzie. March 1st, 1939. (525840.)

6790. "Electrical immersion heaters." J. D. F. Doyle. March 2nd, 1939. (525850.)

6848. "Electrically driven vehicles." General Electric Co., Ltd., and E. H. Croft. March 2nd, 1939. (525886.)

6862. "Vacuum cleaners." British Thomson-Houston Co., Ltd. March 3rd, 1938. (525889.)

6903. "Electric plug-and-socket connectors." Telephone Manufacturing Co., Ltd., and G. E. Taylor. March 2nd, 1939. (525901.)

6905. "Telephone and like electrical signalling and/or control systems." Automatic Telephone & Electric Co., Ltd., R. Taylor, and T. G. Baker. March 2nd, 1939. (Cognate application, 7462/39.) (525902.)

6913. "Electrically operated fluid heater cleaner systems." H. Pryce-Jones and A. E. Sweeney. March 2nd, 1939. (525905.)

6914. "Vapour generators with reheaters and/or superheaters." Babcock & Wilcox, Ltd., and E. L. Luly. March 2nd, 1939. (525906.)

6954. "Suction cleaners." Hoover, Ltd. March 9th, 1938. (525918.)

7019. "Electrical filter networks." Siemens Bros. & Co., Ltd., and M. Reed. March 3rd, 1939. (525931.)

7056. "Luminous electric discharge devices." Soc. Anon. pour les Applications de l'Electricité et des Gas Rares Établissements Claude, Paz et Silva. May 19th, 1938. (525943.)

7068. "Electric selective signalling or remote control apparatus." Westinghouse Brake & Signal Co., Ltd., and D. G. Shipp. March 3rd, 1939. (525947.)

7079. "Electron-discharge device amplifier oscillator and like circuit arrangements for use on very high frequencies." Telefunken Ges. für Drahtlose Telegraphie. March 3rd, 1938. (525951.)

7084. "Thermionic amplifiers." Standard Telephones & Cables, Ltd., K. G. Hodgson, and A. H. Roche. March 3rd, 1939. (525953.)

7085. "Television receivers." Kolster-Brandes, Ltd., R. E. Prichard, and C. N. Smyth. March 3rd, 1939. (Addition to 520235.) (525967.)

7086. "Radio and television receivers." Kolster-Brandes, Ltd., and C. N. Smyth. March 3rd, 1939. (525968.)

7087. "Synchronised time base circuits." Kolster-Brandes, Ltd., and C. N. Smyth. March 3rd, 1939. (525969.)

7145. "Illuminating devices for episcopes." E. Leitz Ges. May 28th, 1938. (525979.)

7149. "Contact-breaker arms for ignition apparatus." British Thomson-Houston Co., Ltd., and R. T. Coe. March 4th, 1939. (525980.)

7223. "Adjustment of carbons of arc lamps." E. Bauer Ges. March 5th, 1938. (525997.)

7234. "Method of transmitting electric power." A. H. Blue and R. D. Wood. March 6th, 1939. (525998.)

7236. "Headlamps." E. A. Norheim. March 6th, 1939. (525999.)

7277. "Electric circuit-control systems." British Thomson-Houston Co., Ltd. March 5th, 1938. (526012.)

7278. "Systems employing electric valve means for the control of electric motors, particularly applicable to arc-welding control." British Thomson-Houston Co., Ltd. March 5th, 1938. (526013.)

7279. "Electric chokes." British Thomson-Houston Co., Ltd. March 5th, 1938. (526014.)

7322. "Electrically operated totalisators." Telyu Electric Totalisators, Ltd. March 7th, 1938. (Cognate application, 7323/39.) (526023.)

11853. "Multiplex telephony systems." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 22nd, 1938. (525594.)

11954. "Multiplex telephony systems." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 23rd, 1938. (525675.)

13975. "Electric discharge tubes." Mullard Radio Valve Co., Ltd. May 13th, 1938. (525595.)

13976. "Electric discharge tubes." Mullard Radio Valve Co., Ltd. May 13th, 1938. (525596.)

14369. "Method of soft-soldering insulated flexible electric conductors." Naamlooze Vennootschap Pope's Metaaldraadlampenfabriek. May 16th, 1938. (525597.)

14372. "Signal receivers for telephone systems." Philips Lamps, Ltd. May 16th, 1938. (525676.)

15477. "Superheterodyne radio receivers." Philips Lamps, Ltd. May 27th, 1938. (525869.)

15593. "Devices for scanning kinematograph films." Philips Lamps, Ltd. May 28th, 1938. (525870.)

15779. "Electrolytic condensers." Philips Lamps, Ltd. May 30th, 1938. (525871.)

16204. "Friction ratchet mechanism applicable for tuning radio receivers." Philips Lamps, Ltd. June 4th, 1938. (525598.)

16480. "Electric discharge tubes." Mullard Radio Valve Co., Ltd. June 8th, 1938. (525599.)

16481. "Construction of electric discharge tubes." Mullard Radio Valve Co., Ltd. June 8th, 1938. (525600.)

17079. "Circuit arrangement comprising a cathode-ray tube." Mullard Radio Valve Co., Ltd. June 13th, 1938. (525601.)

17080. "Haircutting machines, such as electrically-driven shaving apparatus." Philips Lamps, Ltd. June 13th, 1938. (525602.)

17440. "Electric wave-filters." Philips Lamps, Ltd. June 17th, 1938. (525603.)

19220. "Electric incandescent lamps." Philips Lamps, Ltd. July 4th, 1938. (525604.)

19753. "Collector-heads or current collectors for trolley buses and the like." R. Livingstone and Anti-Attrition Metal Co., Ltd. January 26th, 1939. (Divided out of 508686.) (525872.)

21023. "Devices for automatically controlling the bandwidth in radio receivers and other apparatus." Philips Lamps, Ltd. July 22nd, 1938. (525606.)

27538. "Electrically-operated calculating apparatus." Standard Telephones & Cables, Ltd. (L. Kozma and J. Kruithof.) November 21st, 1938. (Divided out of 525330.) (525396.)

27540. "Electrically-operated calculating equipment." Standard Telephones & Cables, Ltd. (L. Kozma and J. Kruithof.) November 21st, 1938. (Divided out of 525330.) (525397.)

27541. "Electrical calculating-apparatus." Standard Telephones & Cables, Ltd. (L. Kozma and J. Kruithof). November 21st, 1938. (Divided out of 525330.) (525398.)

27622. "Electric discharge tubes for the photo-electric transformation of light." Mullard Radio Valve Co., Ltd. October 13th, 938. (525608.)

# PERU'S ELECTRICAL IMPORTS

## Improved Position of Canada

AFTER a steady expansion over a period of six years the Peruvian imports of electrical material shrunk to some extent last year, although in some of the smaller items, such as batteries, lighting material (including lamps), refrigerators and telephone apparatus, the business continued to increase.

The following statement, based on the Peruvian trade returns, shows the values of the imports of the principal lines in 1939, with the leading countries of origin, and a note of increases and decreases as compared with the previous year. (£1 equals 20 soles, approx.).

A prominent feature in the competition for trade in certain classes is the more frequent appearance of Canadian suppliers whose trade as a whole in the Peruvian market for electrical material exceeds that of Great Britain.

The total value of the imports grouped under the heading of electrical goods and apparatus was 9,790,000 soles, about a million soles less than in 1938. The share of the United States, which was the leading supplier, was well maintained at 5 million soles, with Germany next (1,686,000 soles against 2,150,000 soles in 1938), followed by Belgium (863,000 soles), Canada (398,000 soles) and Great Britain (289,000 soles).

In forecasting the future of Peruvian import demand a number of varying influences have to be considered. The yield from agricultural production during the last season was normal for the most part but there were substantial unsold stocks of cotton. Mining and metallurgy were active well into the summer, but then marketing difficulties caused some accumulation of stocks. Gold was an exception and a record return is expected in this branch.

Local factory enterprise received an impetus from the drive to repair the earthquake damage of May, combined with the rise in the prices of imported goods. On the whole it is expected that the slackening of the demand for Peruvian staple commodities will adversely affect the import trade in all but the strictest necessities.

| | 1939 Soles (000) | Inc. or dec. on 1938 Soles (000) |
|---|---|---|
| *Switches, circuit-breakers and similar accessories—* | | |
| Total | 563 | −131 |
| From Germany | 161 | − 62 |
| „ United States | 337 | − 31 |
| „ United Kingdom | 11 | − 24 |
| „ Japan | 8 | − 5 |
| *Batteries, up to 30 kg. and parts—* | | |
| Total | 524 | + 90 |
| From Germany | 38 | + 2 |
| „ United States | 422 | + 94 |
| „ United Kingdom | 20 | − 12 |
| „ Japan | 13 | — |
| *Batteries, over 30 kg.—* | | |
| Total | 60 | − 45 |
| From Germany | 7 | − 8 |
| „ United States | 46 | − 22 |
| „ United Kingdom | 2 | − 17 |
| *Insulators—* | | |
| Total | 94 | + 19 |
| From United States | 33 | − 13 |
| „ United Kingdom | 13 | + 4 |
| „ Germany | 30 | + 15 |
| *Insulated wire and cable, up to 3 mm. diameter—* | | |
| Total | 418 | + 13 |
| From Germany | 76 | − 32 |
| „ United States | 216 | + 11 |
| „ United Kingdom | 12 | − 12 |
| „ Canada | 43 | + 19 |
| *Wire and cable, up to 3 mm., lead-covered—* | | |
| Total | 99 | + 32 |
| From Germany | 77 | + 46 |
| „ United States | 8 | + 6 |
| „ Canada | 2 | − 1 |
| *Copper wire, over 3 mm. diameter, covered, etc.—* | | |
| Total | 384 | − 64 |
| From Germany | 69 | −140 |
| „ United States | 244 | + 31 |
| „ United Kingdom | 12 | + 1 |
| „ Italy | 51 | + 37 |
| *Copper wire, over 3 mm. diameter, lead-covered—* | | |
| Total | 95 | − 18 |
| From Germany | 35 | − 46 |
| „ United Kingdom | 1 | − 5 |
| „ United States | 7 | − 9 |
| „ Italy | 49 | + 39 |
| *Wire, insulated or uninsulated, lead-covered or armoured—* | | |
| Total | 180 | −306 |
| From Germany | 6 | − 21 |
| „ United States | 103 | + 77 |
| „ Italy | 53 | −377 |
| „ United Kingdom | 1 | — |
| *Flex, covered with fabric—* | | |
| Total | 50 | − 10 |
| From Germany | 13 | − 19 |
| „ United States | 12 | − 2 |
| „ United Kingdom | 1 | − 2 |
| „ Japan | 8 | + 3 |
| *Telephone cable, lead-covered—* | | |
| Total | 276 | + 34 |
| From United Kingdom | 26 | −182 |
| „ Canada | 246 | +246 |
| *Telephone apparatus—* | | |
| Total | 333 | + 33 |
| From Belgium | 231 | + 61 |
| „ Germany | 15 | − 9 |
| „ United States | 39 | + 11 |
| „ United Kingdom | 31 | − 15 |
| *Radio apparatus—* | | |
| Total | 1,761 | −395 |
| From Germany | 260 | + 21 |
| „ United Kingdom | 126 | + 11 |
| „ United States | 1,045 | −322 |
| „ Holland | 318 | + 3 |
| *Radio valves—* | | |
| Total | 151 | + 29 |
| From United Kingdom | 34 | − 1 |
| „ Holland | 4 | − 10 |
| „ United States | 102 | + 32 |
| *Household heating apparatus, not over 10 kg.—* | | |
| Total | 90 | − 3 |
| From Germany | 27 | − 14 |
| „ United States | 57 | + 9 |
| *Heating apparatus, heavier, including industrial—* | | |
| Total | 407 | − 2 |
| From Germany | 186 | −135 |
| „ United States | 200 | +150 |
| „ Italy | 17 | + 17 |
| *Vacuum cleaners, etc.—* | | |
| Total | 34 | − 27 |
| From Germany | 12 | − 28 |
| „ United States | 15 | − 3 |
| *Unspecified electrical goods—* | | |
| Total | 127 | −127 |
| From United States | 84 | − 96 |
| „ Germany | 14 | − 18 |
| *Lamps up to 50 W—* | | |
| Total | 366 | + 53 |
| From Germany | 69 | − 14 |
| „ United States | 135 | + 41 |
| „ Holland | 33 | − 8 |
| „ Japan | 54 | + 11 |
| *Lamps over 50 and up to 200 W—* | | |
| Total | 258 | + 48 |
| From Germany | 26 | − 15 |
| „ United States | 97 | + 16 |
| „ Holland | 22 | − 12 |
| *Lamps, over 200 W.—* | | |
| Total | 46 | + 8 |
| From United States | 25 | + 2 |
| *Meters, house—* | | |
| Total | 200 | + 98 |
| From Germany | 78 | + 25 |
| „ Canada | 49 | + 23 |
| *Electro-magnetic apparatus, medical—* | | |
| Total | 348 | + 72 |
| From United States | 124 | + 58 |
| „ Germany | 25 | −177 |
| *Refrigerators—* | | |
| Total | 586 | + 57 |
| From United States | 578 | + 61 |
| *Fractional-HP motors—* | | |
| Total | 87 | + 14 |
| From United States | 77 | + 16 |
| „ United Kingdom | 3 | + 3 |
| *Dynamos and spare parts—* | | |
| Total | 134 | + 52 |
| From Germany | 40 | + 11 |
| „ United Kingdom | 2 | − 17 |
| „ United States | 90 | + 66 |
| *Switchboards—* | | |
| Total | 687 | +151 |
| From Germany | 41 | + 6 |
| „ United States | 83 | − 23 |
| „ United Kingdom | 5 | − 74 |
| „ Belgium | 550 | +275 |
| *Current transformers over 1 kW and rectifiers over 3 A—* | | |
| Total | 635 | −329 |
| From Germany | 103 | + 37 |
| „ United States | 247 | −150 |
| „ Switzerland | 225 | −249 |
| *Insulating tubes—* | | |
| Total | 142 | − 8 |
| From Germany | 7 | − 1 |
| „ United States | 117 | − 20 |
| *Ammeters, galvanometers, &c.—* | | |
| Total | 86 | − 70 |
| From United States | 51 | − 53 |
| „ United Kingdom | 4 | − 4 |
| „ Germany | 18 | − 16 |
| *Fans—* | | |
| Total | 29 | − 3 |
| From United States | 24 | + 1 |

# FINANCIAL SECTION

**New Companies. Capital Returns. Debenture Charges. Bankruptcies and Liquidations. Reports and Dividends. Stocks and Shares.**

## New Companies Registered

**F. Foster & Co., Ltd.**—Private company. Registered September 18th. Capital £300. Objects: To carry on the business of domestic, electrical, gas, sanitary, mechanical, motor, oil fuel, civil and consulting engineers, millwrights, ironmasters and founders, manufacturers of, and dealers in, forgings, castings, projectiles, &c. The directors are: F. Foster, 88, Edgell Road, Staines; C. Woodadge, 45, Hythefield Avenue, Thorpe Road, Staines; W. Hickson, High Street, Wraysbury, near Staines; & W. R. Willis, 47, Shortwood Avenue, Staines, Mdx. Secretary: F. Foster. Registered office: High Street, Wraysbury, near Staines.

**L. C. Down, Ltd.**—Private company. Registered September 19th. Capital £500. Objects: To acquire the business of an electrical and radio engineer carried on by L. C. Down, at 88, High Street, Three Bridges, and 41, High Street, Crawley, Sussex. The directors are: L. C. Down and L. E. Down, both of 88, High Street, Three Bridges. Registered office: 88, High Street, Three Bridges.

**Barnes Bros. (Welders), Ltd.**—Private company. Registered September 20th. Capital, £1,000. Objects: To carry on the business of welders, mechanical, aeronautical, motor and electrical engineers, ironmasters and founders, steel makers, &c. The subscribers are: V. W. Sayer and V. G. Sayer, both of 407, Ewell Road, Tolworth, Surrey. Secretary: V. G. Sayer.

## Companies' Returns

**Clarke Chapman & Co., Ltd.**—Capital, £550,000 in 7,000 preference shares of £10 and 480,000 ordinary shares of £1. Return dated March 15th, 1940. 6,985 preference and 480,000 ordinary shares issued and fully paid up. Mortgages and charges, nil.

**Mid Cumberland Electricity Co., Ltd.**—Capital, £350,000 in £1 shares. Return dated April 19th, 1940. 343,350 shares taken up. £338,269 paid. £5,231 considered as paid. Mortgages and charges, nil.

**Allen West & Co., Ltd.**—Capital stock, £700,000 in 2,800,000 units of 5s. Return dated May 3rd, 1940. £487,500 stock taken up. £447,935 5s. paid. £39,564 15s. considered as paid. Mortgages and charges at date of return, £214,409. Since registered second debenture dated July 8th, 1940, to secure £72,750.

**Electric Supply Corporation, Ltd.**—Capital, £750,000 in 431,262 ordinary, 250,000 preference and 68,738 unissued shares, all of £1. Return dated May 13th, 1940. 431,262 ordinary and 250,000 preference shares taken up. £529,000 paid on 279,000 ordinary and 250,000 preference shares. £152,252 considered as paid on 152,252 ordinary shares. Mortgages and charges, nil.

**West Devon Electric Supply Co., Ltd.**—Capital stock, £450,000 in £350,000 ordinary and £100,000 preference stock. Return dated May 16th, 1940. All stock taken up. £386,513 paid. £63,487 considered as paid. Mortgages and charges, nil.

**Kelvinator, Ltd.**—Capital, £65,000 in 40,000 preference shares of £1 and 500,000 ordinary shares of 1s. Return dated June 5th, 1940. All shares taken up. £65,000 paid. Mortgages and charges, nil.

**British Power & Light Corporation, Ltd.**—Capital, £4,000,000 in £1,000,000 6 per cent. preference stock; £600,000 4½ per cent. preference stock; £2,030,000 ordinary stock; and 370,000 shares of £1. Return dated March 29th, 1940. All stock taken up. £2,783,730 paid (£1 on £600,000 preference stock, 28s. 9d. on £400,000 6 per cent. preference stock, 21s. on £600,000 4½ per cent. preference stock, £1 on £554,500 ordinary stock and 25s. on £339,384 ordinary stock). £1,136,116 considered as paid (£1 on £1,136,116 ordinary stock). Mortgages and charges, nil.

**North Lincolnshire & Howdenshire Electricity Company, Ltd.**—Capital, £500,000 in £1 shares. Return dated April 1st, 1940. All shares taken up. £480,191 paid. £19,809 considered as paid. Mortgages and charges, nil.

**Merthyr Electric Traction & Lighting Co., Ltd.**—Capital, £100,000 in 6,000 5 per cent. accumulative preference and 14,000 ordinary shares of £5. Return dated May 24th, 1940. 6,000 preference and 13,000 ordinary shares taken up. £95,000 paid. Mortgages and charges: £48,822 10s. 2d.

**Wycombe (Borough) Electric Light & Power Co., Ltd.**—Capital, £200,000 in 175,000 ordinary and 25,000 preference shares of £1. Return dated May 29th, 1940. 175,000 ordinary and 15,000 preference shares taken up. £172,000 paid on 157,000 ordinary and 15,000 preference shares. £18,000 considered as paid on 18,000 ordinary shares. Mortgages and charges, nil.

**Anglo-American Telegraph Co., Ltd.**—Capital stock, £7,000,000 in £205,100 ordinary stock; £3,397,450 preferred ordinary stock, and £3,397,450 deferred ordinary stock. Return dated May 30th, 1940. All stock taken up. £600,000 paid. £6,400,000 considered as paid. Mortgages and charges, nil.

### Bankruptcy Proceedings

**R. A. J. Tully,** 32J, Viaduct Road, Brighton, electrician.—This debtor's public examination was held at the Court House, Church Street, Brighton, recently. It was stated that the liabilities amounted to £127, and there was a deficiency of £123. The failure was attributed by debtor to the loss of an action arising out of a road accident. The examination was adjourned for closing.

**L. F. Kent,** 32, High Street, Broadstairs, radio and electrical engineer.—This debtor attended at the Guildhall, Canterbury, recently, for his public examination on accounts showing liabilities of £479, against assets of £358, leaving a deficiency of £121. The failure was attributed to the cessation of business owing to the war. Since the crisis of September, 1938, the turnover had declined. The examination was concluded.

**H. A. Tutte,** electrical engineer, 32, Merry Hill Road, Bushey, Herts.—The public examination of this debtor was held recently at the Court House, Town Hall, St. Albans. The statement of affairs disclosed liabilities of £268, against assets estimated to realise £26, leaving a deficiency of £242. The debtor ascribed his failure to decline in trade owing to the international crisis and consequent insufficient profits to meet drawings and overhead charges. The examination was adjourned.

**T. Maund,** 37, Earle Road, Bramhall, Chester, lately trading at 80, Wellington Road North, Heaton Norris, Stockport, as an electrical engineer under the style of Beacon Electrical Co. (now traveller for leather goods manufacturer).—Public examination October 25th at the Court House, Stockport.

**J. V. Reynolds,** at present serving in the Army, described in the receiving order as trading as British Electrical Installations Co., 7, Lambs Conduit Street, London, W.C.1, electrical engineer.—Application for discharge to be heard on October 15th at Bankruptcy Buildings, Carey Street, London, W.C.2.

**H. M. Wise** (H. M. Wise & Sons), electrical engineer and radio dealer, Corvedale Road, Craven Arms, Salop.—Application for discharge to be heard on October 21st at the Town Hall, Leominster.

**C. Richmond,** 7, Royd Crescent, Clay Pitts Lane, Halifax, formerly trading as C. Richmond & Son at 73, Hanson Lane and 17a, Acorn Street, Halifax, electrical and radio engineer.—Trustee, Mr. W. F. Cresswell, 71, Manningham Lane, Bradford, Official Receiver, released September 17th.

**B. J. Wheldon,** electrician and wireless salesman, 336, Londonderry Road, Langley, Oldbury.—Trustee, Mr. R. K. Clark, 37, Temple Street, Birmingham, Official Receiver, released September 17th.

**A. T. Burden,** electrical engineer carrying on business as "Meth-Lac" Works, Upper Devizes Road, Salisbury.—Last day for receiving proofs for dividend, October 4th. Trustee, Mr. H. T. Jones, 12, Rolleston Street, Salisbury, Official Receiver.

## Reports and Dividends

**The Ransome & Marles Bearing Co.,** reports a net profit for the year to June 30th of £163,038, as compared with £160,038 for 1938-39, to which is added £72,922 brought in, making £235,960. Taxation requires £35,000, special reserve for depreciation £35,000, and as already announced, the final dividend is 11 per cent., making 20 per cent. for the year (same). Directors' remuneration requires £3,000 and £77,735 is carried forward. Notes issued on the remarks to be made by the chairman at to-day's (Friday) annual general meeting state that the trading period includes ten months of war and in consequence comparisons with past years are of little interest, and it would be useless to regard this period as any indication of the prospects in normal times. Ordinary commercial business was of course disturbed to a very large extent by the switching over of many interests to war production, but the company's products are of such universal application that there have been no serious problems with regard to cancelled contracts. The additional shop referred to by the chairman a year ago was duly completed during the year and the whole of the plant has been fully occupied. In view of the position outlined above there is little that could be usefully said regarding future prospects. The order book is, however, very satisfactory and in the absence of unforeseen circumstances this year's results should enable the company to maintain the present rate of dividend.

**The British Columbia Power Co., Ltd.,** reports that, after deducting the proportion of bond and debenture interest and preference dividends from the total net earnings for the period January 1st to August 31st, there is a surplus of $1,452,821. This is $128,305 more than in the corresponding period last year.

**Hopkinsons, Ltd.,** are maintaining their interim ordinary dividend at 5 per cent., less tax.

**The Midland Electric Corporation for Power Distribution, Ltd.,** is again paying an interim ordinary dividend of 3 per cent.

**Callender's Cable and Construction Co., Ltd.,** is paying an interim dividend of 5 per cent. on the ordinary stock. This interim rate has been paid for many years past.

**The Woking Electric Supply Co., Ltd.,** has announced an interim dividend of 3 per cent., tax free (unchanged).

**The Isle of Thanet Electric Supply Co., Ltd.,** states that owing to prevailing conditions, it has no option other than to postpone the payment of further dividends on the 6 per cent. participating preference shares.

**Lancashire Dynamo & Crypto, Ltd.,** is maintaining its interim dividend at 5 per cent.

**Associated Fire Alarms, Ltd.,** is paying a first and final dividend of 6 per cent. (same).

**Murex, Ltd.,** announces a final ordinary dividend of 10 per cent., and a cash bonus of 2½ per cent., maintaining the distribution for the year at 20 per cent.

**Ericsson Telephones, Ltd.,** has declared an interim dividend of 5 per cent., tax free (against 6 per cent., tax free).

# STOCKS AND SHARES

TUESDAY EVENING

STOCK EXCHANGE markets continue to be influenced to some extent by the unique circumstances created by air-raid excitements. It is impossible to deal with any degree of physical comfort when members may be turned out of the House by siren warnings liable to arise at a moment's notice. The outstanding feature is the firmness shown by gilt-edged securities, a firmness that was but slightly disturbed by Japan being allowed by Germany and Italy to hold what the schoolboy would call the dirty end of the Axis stick.

Prices of electricity supply shares are easier, the declines ranging from ninepence to a florin. For these, the accepted explanation is renewal of nervousness with regard to possible damage of plant, etc., by visitations from the air. Industrials hold their prices fairly well, interim dividend declarations assisting in this steadiness. A fall of 3s. in Tilling & British Automobile shares is notable. Cable & Wireless retain their previous levels.

## The Treasury Unbends

On Tuesday in this week, the Treasury relaxed certain of its requirements in regard to sales of dollar and other securities shipped to Canada for safety's sake. Reference has been made here on several occasions to the freezing process which has been applied to these particular securities since the middle of last June. Until Tuesday the holder whose dollar securities had been sent, even without his knowledge, to Canada for safe custody, has been unable to deal with them, but under the new arrangement the Bank of England will issue permits allowing the sale of the stocks, provided these are made abroad.

As previously explained, the proprietor of, say, 100 American Telephone and Telegraph shares, who had kept the certificates under his own control, though registering them, of course, with the Bank of England, found no restriction placed in the way of his realising them, provided he did so on the other side of the Atlantic. Now everybody is to be placed on the same footing. The owner of shares which have been lodged with the Bank of England agency in Montreal is free to obtain a permit to sell his shares, if he so wishes. In such cases as those where the normal market is in London, the latitude of dealing is extended.

A more interesting concession is that which, under the same Treasury notice, permits a measure of free dealing to be restored for dollar and other securities, the market for which is normally in London. The method by which this may be done is, the Treasury announces, in course of preparation. The American market has been the most hardly-hit department of the Stock Exchange since the outbreak of war. Its dealers have seen their livelihood vanish. The latest order, which came into force on Tuesday in this week, opens the door at least a little way to a feeling of hopefulness that the American market may, in time, again attract the attention of people in this country.

## Interim Dividends

The majority of interim dividends now in course of announcement follow the same rates as those of a year ago. Ericsson Telephones has reduced its usual 6 per cent. tax free, by 1 per cent. This does not necessarily mean any alteration of the annual 25 per cent. tax-free dividend distributed for the past four years. The final dividend has been declared, however, as 12 per cent. plus a bonus of 7 per cent., and it would hardly be surprising if the latter were to be cut at the end of the twelve-month. Midland Electric Power Distribution declares its usual 3 per cent. interim, and amongst others to follow similar lines are W. T. Henley's (5 per cent.). West Riding Automobile (4 per cent.), Lancashire Dynamo (5 per cent.), Hopkinsons (5 per cent.) and Woking Electric (3 per cent.). Isle of Thanet has postponed the further dividend on its 6 per cent. participating preference; the dividend is cumulative. West Riding shares are 1s. better at 31s.; none of the other shares just mentioned has changed in price.

## Callender's Cable

Callender's Cable and Construction have declared the usual interim dividend of 5 per cent.; the same as that which has been paid for many years past. The price of the shares is 2s. 6d. better, at 55s. Callender's ordinary shares, it may be recalled, used to be of £5 each. These were sub-divided into five shares of £1 each twenty years ago. The profits made consistent annual progress from 1931 to 1936 inclusive; in 1939, they reached the high-water mark of £670,900. For the full year 1939, as for 1938, the dividend was 15 per cent., comparing with 20 per cent. in each of the two previous years, these last following a long series of 15 per cent.; the same, that is to say, as is now being paid. The company occupies a position of great financial strength. Its cash in hand at the end of 1939 was £276,956; property and plant in the balance sheet was valued conservatively at £886,000.

It is taken for granted that the dividend for the whole year will again be 15 per cent. which, at the present price of 55s. will allow 5½ per cent. on the money. The market in the shares, ordinarily fairly free, has become restricted by war conditions, and as a rule it is rather more easy to dispose of shares than it is to buy them.

## Murex Dividend

Murex, Ltd., is engaged in the manufacture of electrodes and apparatus for electric arc welding. It holds substantial interests in the Premier Electric Welding Co. (Mersey) at Liverpool and the E.M.F. Electric Co. of Australia. In each of the past three years, a dividend of 20 per cent. has been paid on the ordinary shares. In view of the war, a little doubt had been expressed as to whether the company would be able to maintain this rate in respect of the year ended June 30th last, so that the declaration of the regular 12½ per cent. final dividend, making 20 per cent. for the year, gave the more satisfaction.

To what extent the company is engaged on war work is at present a matter of conjecture, but no doubt the chairman will go as fully as circumstances permit into the matter at the forthcoming meeting. The price of the shares was little affected by the dividend announcement, and at its present 67s. 6d., the yield on a 20 per cent. dividend basis comes to nearly 6 per cent. The company, it may be added, works closely with Imperial Chemical Industries, holders of a substantial portion of the ordinary share capital of Murex, Ltd.

## London Associated Electric

A weak spot in the electricity supply companies' list is provided by London Associated Electric ordinary shares. This seems the more surprising when it is remembered that the company acquired, some years ago, by an exchange of shares, a controlling interest in six front-rank London supply companies.

The six constituent parts of the London Associated were flourishing and prosperous concerns. They paid an average dividend of about 7 per cent. per annum, and, for the four years 1935-38, London Associated followed suit with a dividend of like amount. Then the dividend was reduced to 5½ per cent. for the year ended December 31st, 1939, and, in respect of the six months of the present year, no interim distribution was made. The present price of the shares, 12s. 6d., hints that no great expectations are fixed upon what the final dividend for the present year may be. Some people, indeed, think that the company may have to pass this altogether. Hence the fall in the shares. Reasons for dwindling revenue are, mostly, peculiar to London; evacuation, black-out and rising costs, being three of the principal. The company, serving the districts that it does, can hardly fail to do well in normal times. War conditions have mal-influenced the profits, and thereby shaken the price of the shares.

## Miscellaneous Matters

British Electric Traction deferred stock has put on 20 points at 620, support being attracted by the satisfactory dividend declarations of various provincial bus companies in which the B.E.T. holds substantial interests. Home Railway stocks move in the opposite direction: Southern preferred is down to 40½, and by no means a good market even at that reduced figure. The 5 per cent. preference drooped to 71½, showing a loss of 2½. Yet the gilt-edged stocks keep good, under the leadership of War Loan. London Electric Transport 2½ per cent. guaranteed has hardened to 92, at which the flat yield is no more than £2 14s. 4d. per cent. The stock is redeemable at 100, and is dated 1950-55. Anglo-American preferred and deferred are in better demand than supply, as is indicated in rises of a point in each of the stocks. Amongst overseas issues, Whitehall Electric preference have strengthened to 10s. 0d. ex dividend, and Anglo-Argentine Tramways improved in sympathy with a rising tendency in the Argentine railway market.

## The Kindly Ill Wind

That same ill wind which profits nobody is said to be favouring the radio and battery industry, and to be stimulating a demand for wireless sets. People who stay at home now-a-nights are relying upon the wireless for news and entertainment: this gives rise to inquiries for up-to-date sets and to the scrapping of those that hitherto were regarded as good enough to go on with. Some of the shelters, too, are being equipped with wireless, while another source of demand comes from the widely-scattered quarters of the Forces and of Home Defence units. Prices of shares in the companies that deal with wireless and its ancillary branches are priming up after a long period of depression. Manufacturers of electric lamps are said to be very busy, and, as the black-out time lengthens with each day, the need for replenishing torches and batteries becomes more insistent.

The N.V. Philips Lamp Works Company is holding its annual general meeting on October 5th next. As this will take place at the Company's office in Curaçao, the proceedings are unlikely to be disturbed by air-raid warnings.

# ELECTRICAL COMPANIES' SHARES

## Prices, Dividends and Yields

| Company | 1940 Highest | 1940 Lowest | Dividend Previous | Dividend Last | Middle Price Sept. 30 | Rise or Fall | Yield p.c. £ s. d. |
|---|---|---|---|---|---|---|---|
| **Home Electricity Companies** | | | | | | | |
| Bournemouth and Poole | 63/6 | 38/9 | 15 | 15 | 37/6 | −1/2 | — |
| British Power and Light | 30/- | 21/- | 7 | 7 | 23/6 | .. | 5 19 2 |
| City of London | 28/- | 20/- | 7½ | 7½ | 20/- | −1/6 | — |
| Clyde Valley | 38/6 | 25/- | 8 | 8 | 31/3 | .. | 5 2 5 |
| County of London | 43/3 | 22/- | 10½ | 10½ | 25/- | −2/6 | 8 8 0 |
| Edmundson's: | | | | | | | |
| 7% Pref | 31/6 | 26/3 | 7 | 7 | 28/3 | .. | 4 19 1 |
| Ord. | 27/6 | 18/6 | 9 | 6 | 22/- | −1/- | 5 9 1 |
| Elec. Dis. Yorkshire | 40/3 | 32/6 | 9 | 9 | 32/6 | .. | 5 10 9 |
| Elec. Fin. and Securities | 41/3 | 34/6 | 12½ | 12½ | 38/9 | .. | 6 9 0 |
| Elec. Supply Corporation | 46/3 | 37/- | 12 | 11½ | 37/0 | −6d. | 6 4 4 |
| Isle of Thanet | 16/- | 5/6 | 4 | 4 | 6/- | .. | — |
| Lancs Light and Power | 33/- | 25/- | 7½ | 7½ | 25/0xd | −6d. | 5 16 6 |
| Llanelly Elec. | 21/- | 17/- | 5½ | 5½ | 17/6 | .. | 6 5 9 |
| Lond. Assoc. Electric | 21/- | 12/6 | 7 | 5½ | 12/6 | −1/2 | — |
| London Electric | 37/6 | 19/- | 8 | 7 | 20/- | .. | 7 0 0 |
| London Power Deb. Red. | 105½ | 101 | 5 | 5 | 100½ | .. | 4 19 6 |
| Metropolitan | 41/6 | 23/6 | 12 | 10 | 27/6 | −1/2 | 7 5 6 |
| Midland Counties | 39/- | 24/3 | 8 | 8 | 27/6xd | .. | 5 16 5 |
| Mid. Elec. Power | 40/- | 29/6 | 9 | 9 | 32/- | .. | 5 12 6 |
| Newcastle Elec. | 29/9 | 24/6 | 7 | 7 | 22/6 | −2/- | 6 7 3 |
| North Eastern Elec.: | | | | | | | |
| Ordinary | 31/6 | 17/6 | 7 | 7 | 22/6 | .. | 6 4 5 |
| 7% Pref. | 32/6 | 26/6 | 7 | 7 | 27/6 | .. | 5 1 10 |
| Northampton | 48/- | 39/- | 10 | 10 | 38/9 | .. | 5 3 3 |
| Notting Hill 6% Pref. (£10) | 10¾ | 9 | 6 | 6 | 9 | .. | — |
| Northmet Power: | | | | | | | |
| Ordinary | 42/3 | 23/- | 10 | 10 | 28/3 | −6d. | — |
| 6% Pref. | 29/- | 23/- | 6 | 6 | 26/- | .. | 4 12 4 |
| Richmond Elec. | 24/6 | 18/- | 7 | 6 | 18/9 | .. | — |
| Scottish Power | 38/- | 24/- | 8 | 8 | 27/6 | −9d. | 5 16 5 |
| Southern Areas | 21/3 | 13/9 | 5 | 5 | 12/6 | −1/2 | 8 0 0 |
| South London | 23/3 | 20/- | 7 | 7 | 20/- | .. | 7 0 0 |
| West Devon | 20/- | 18/6 | 5 | 5 | 20/- | .. | 5 0 0 |
| West Glos. | 21/3 | 15/- | 2½ | 4½ | 16/3 | .. | 5 10 10 |
| Yorkshire Elec. | 40/- | 24/6 | 8 | 8 | 28/9 | .. | 5 11 4 |
| **Overseas Electricity Companies** | | | | | | | |
| Atlas Elec. | 4/- | 1/3 | Nil | Nil | 1/9 | .. | — |
| Calcutta Elec. | 37/- | 22/6 | 10* | 8* | 28/- | .. | 5 14 6 |
| Cawnpore Elec. | 30/- | 24/- | 10 | 10 | 25/- | .. | 8 0 0 |
| East African Power | 25/6 | 20/- | 7 | 7 | 20/- | .. | 7 0 0 |
| Jerusalem Elec. | 24/- | 17/9 | 7 | 7 | 18/9 | .. | 7 9 4 |
| Kalgoorlie (10/-) | 12/6 | 9/6 | 7½ | 7½ | 11/- | .. | 6 16 5 |
| Madras | 26/9 | 23/6 | 8* | 6* | 25/- | +1/4 | 4 16 1 |
| Montreal Power | 35½ | 30 | 1½ | 1½ | 32 | .. | — |
| Palestine Elec. "A" | 25/- | 13/- | 5* | Nil | 12/6 | −1/2 | — |
| Perak Hydro-electric | 20/3 | 13/6 | 6 | 2½ | 13/9 | .. | 3 12 9 |
| Shawinigan Power | 27½ | 19 | 83cts. | 90cts. | 20 | −1/2 | — |
| Tokyo Elec. 6% | 69 | 52 | 6 | 6 | 52½ | .. | 11 8 6 |
| Victoria Falls Power | 75/9 | 56/- | 15 | 15 | 65/- | .. | 4 12 4 |
| Whitehall Investments Pref. | 17/9 | 8/- | 7½ | 7½ | 10/-xd | +1/4 | 15 0 0 |
| **Public Boards** | | | | | | | |
| Central Electricity: | | | | | | | |
| 1950–70 | 110¼ | 104 | 5 | 5 | 104½ | .. | 4 15 8 |
| 1955–75 | 112¾ | 106 | 5 | 5 | 105½ | .. | 4 14 9 |
| 1951–73 | 107½ | 102 | 4½ | 4½ | 102½ | .. | 4 7 10 |
| 1963–93 | 96½ | 90 | 3½ | 3½ | 91 | .. | 3 17 0 |
| London Elec. Trans.Gtd. | 92 | 87½ | 2½ | 2½ | 92 | +2 | 2 14 4 |
| London & Home Counties | | | | | | | |
| 1955–75 | 113¼ | 105 | 4½ | 4½ | 105½ | .. | 4 5 4 |
| Lond. Passenger Transport: | | | | | | | |
| A | 116 | 104 | 4½ | 4½ | 107 | .. | 4 4 0 |
| B | 116 | 102½ | 5 | 5 ⅝ | 104½ | .. | 4 15 8 |
| O | 65¼ | 25 | 1½ | 1½ | 28 | .. | 5 7 2 |
| West Midland Joint Elec. | | | | | | | |
| 1948–68 | 106½ | 105 | 5 | 5 | 103½ | .. | 4 16 9 |
| **Telegraph and Telephone** | | | | | | | |
| American Tel. & Tel. | 215 | 180 | 9 | 9 | 200 | .. | 4 10 0 |
| Anglo-Am. Tel.: | | | | | | | |
| Pref. | 106 | 85 | 6 | 6 | 92 | +1 | 6 10 5 |
| Def. | 23⅜ | 18 | 1½ | 1½ | 20½ | +1 | 7 6 4 |
| Anglo-Portuguese | 22/6 | 10/- | 8 | 8 | 15/- | .. | 10 13 4 |
| Cable & Wireless: | | | | | | | |
| 5½% Pref. | 99¾ | 70 | 4½ | 5½ | 86 | .. | 6 8 0 |
| Ord. | 65 | 28½ | 4 | 4 | 50 | .. | 8 0 0 |
| Income | 99¾ | 93 | .. | .. | 97 | .. | 4 0 0 |
| Canadian Marconi $1 | 6/- | 4/- | Nil | 4cts. | 4/6 | +3d. | — |
| Globe Tel. & Tel.: | | | | | | | |
| Ord. | 32/6 | 21/6 | 7½* | 6* | 25/- | .. | 4 16 0 |
| Pref. | 22/9 | 22/6 | 6 | 6 | 23/9 | .. | 5 1 1 |
| Great Northern Tel. (£10) | 20 | 11 | 20 | 20 | 12½ | .. | — |
| Inter. Tel. & Tel. | 5½ | 3 | Nil | Nil | 3½ | .. | — |
| Marconi-Marine | 30/- | 18/3 | 10 | 7½ | 18/9 | .. | 8 0 0 |
| Oriental Telephone Ord. | 2⅞ | 47/6 | 12* | 11¼* | 2⅜ | .. | 4 16 10 |
| Telephone Props. | 15/- | 11/- | 5 | 6 | 12/6 | .. | 9 12 0 |
| Telephone Rentals (5/-) | 9/6 | 5/9 | 10 | 10 | 6/3 | .. | 8 0 0 |
| **Traction and Transport** | | | | | | | |
| Anglo.Arg. Trams: | | | | | | | |
| First Pref. (£5) | 4/3 | 1/3 | Nil | Nil | 2/- | .. | — |
| 4% Inc. | 11½ | 2 | Nil | Nil | 4½ | +1 | — |
| British Electric Traction: | | | | | | | |
| Def. Ord. | 830 | 440 | 5 | 45 | 620 | +20 | 7 5 0 |
| Pref. Ord. | 169 | 134 | 8 | 8 | 140 | .. | 5 14 3 |
| Bristol Trams | 48/6 | 34/6 | 10 | 8* | 35/- | .. | — |
| Brazil Traction | 12½ | 5½ | $1 | 50c. | 5½ | .. | — |
| Calcutta Trams | 24/- | 16/3 | 8 | 5½ | 17/- | .. | 6 9 4 |
| Cape Elec. Trams | 18/6 | 16/- | 5 | 5 | 17/- | .. | 5 17 8 |
| Lancs Transport | 35/- | 27/6 | 10 | 10 | 30/- | .. | 6 13 4 |
| Mexican Light: | | | | | | | |
| 1st Bonds | 33 | 27 | 5 | 5 | 27½ | .. | — |
| Rio 5% Bonds | 90 | 74 | 5 | 5 | 80 | .. | 6 5 0 |
| Southern Rly.: | | | | | | | |
| 5% Prefd. | 79 | 35 | 5 | 5 | 40½ | −2 | 12 6 10 |
| 5% Pref. | 104½ | 60 | 5 | 5 | 71½ | −2½ | 6 19 10 |
| T. Tilling | 45/9 | 31/- | 10 | 10 | 39/- | +9d. | 5 12 8 |
| Tilling & B.A. | 47/6 | 43/9 | 9* | 8* | 42/- | −3/- | — |
| West Riding | 35/- | 26/- | 10 | 10 | 31/- | +1/- | 6 9 0 |
| **Equipment and Manufacturing** | | | | | | | |
| Aron Electricity Ord. | 17/6 | 10/- | 15 | Nil | 14/- | .. | — |
| Assoc. Elec.: | | | | | | | |
| Ord. | 43/3 | 27/- | 10 | 10 | 35/- | .. | 5 14 4 |
| Pref. | 35/3 | 32/3 | 8 | 8 | 33/9 | .. | 4 14 10 |
| Automatic Telephone & El. | 47/3 | 32/- | 12½ | 12½ | 37/6xd | +6d. | 6 13 4 |
| Babcock & Wilcox | 50/- | 28/6 | 10 | 11 | 32/6 | .. | 6 15 4 |
| British Aluminium Ord. | 56/- | 33/- | 12½ | 12½ | 35/9 | .. | — |
| British Insulated Ord. | 92/6 | 67/- | 20 | 20 | 70/-xd | −2/- | 5 14 4 |
| British Thermostat (5/-) | 14/9 | 6/6 | 18½ | 18½ | 8/9 | .. | 10 11 6 |
| British Vacuum Cleaner (5/-) | 12/6 | 4/9 | 40 | 12½ | 6/3 | .. | 10 0 0 |
| Brush Ord. | 4/6 | 1/9 | Nil | Nil | 2/6 | .. | — |
| Callender's | 69/- | 46/- | 15 | 15 | 55/- | +1¼ | 5 9 3 |
| Chloride Elec. Storage | 72/6 | 55/- | 15 | 15 | 2⅝ | .. | 5 4 4 |
| Consolidated Signal | 72/6 | 59/- | 36½ | 17 | 60/- | .. | 5 13 4 |
| Crabtree (10/-) | 24/9 | 17/6 | 17½ | 17½ | 20/- | .. | 8 15 0 |
| Crompton Parkinson: | | | | | | | |
| Ord. (5/-) | 20/- | 12/6 | 30 | 20 | 13/9 | .. | 7 5 6 |
| E. K. Cole (5/-) | 5/- | 2/6 | 10 | Nil | 3/- | .. | — |
| Elec. & Musical Industries (10/-) | 10/3 | 4/3 | 5 | Nil | 6/9 | .. | — |
| Electric Construction | 36/3 | 30/- | 13½ | 10 | 30/- | .. | 6 13 4 |
| Enfield Cable Ord. | 56/- | 40/6 | 25 | 16½ | 42/6 | −1/2 | 7 13 10 |
| Electrical Switchgear (10/-) | 22/6 | 20/- | 16 | 10 | 20/- | .. | 5 0 0 |
| English Electric | 33/9 | 16/6 | 10 | 10 | 23/9 | −1/4 | 8 8 5 |
| Ensign Lamps (5/-) | 15/3 | 12/6 | 25 | 25 | 13/9 | .. | 9 1 10 |
| Ericsson Tel. (5/-) | 39/3 | 25/- | 25* | 25* | 25/- | .. | — |
| Ever Ready (5/-) | 28/3 | 17/3 | 30 | 40 | 24/6 | .. | 8 3 4 |
| Falk Stadelmann | 18/3 | 12/6 | 6 | 7 | 13/9 | .. | 10 3 8 |
| Ferranti Pref. | 25/- | 23/- | 7 | 7 | 23/3 | .. | 6 0 5 |
| G.E.C.: | | | | | | | |
| Pref. | 32/6 | 27/- | 6½ | 6½ | 28/9 | .. | 4 10 6 |
| Ord. | 83/3 | 56/- | 20 | 20 | 69/6 | .. | 5 15 1 |
| Greenwood & Batley | 25/6 | 20/- | 15 | 13 | 20/- | .. | 13 0 0 |
| Hall Telephone (10/-) | 18/6 | 8/9 | 15 | 10 | 11/3 | .. | 8 17 10 |
| Henley's (5/-) | 21/6 | 13/6 | 20 | 20 | 16/3 | .. | 6 3 1 |
| 4½% Pref. | 21/3 | 20/6 | 4½ | 4½ | 21/3 | .. | 4 4 8 |
| Hopkinsons | 46/9 | 33/6 | 12½ | 15 | 35/- | .. | 8 11 6 |
| India-Rubber Pref. | 21/- | 20/- | 5½ | 5½ | 20/9 | .. | 5 6 0 |
| Intl. Combustion | 121/3 | 70/- | 32½ | 32½ | 4 | .. | 8 2 6 |
| J. Lucas | 60/6 | 40/- | 15 | 15 | 50/- | .. | 6 0 0 |
| Johnson & Phillips | 50/9 | 33/- | 12½ | 15 | 40/- | .. | 7 10 0 |
| Lancashire Dynamo | 59/9 | 47/6 | 25 | 20 | 47/6 | .. | 8 8 5 |
| Laurence Scott (5/-) | 11/- | 6/- | 15 | 15 | 8/- | .. | 9 7 6 |
| London Elec. Wire | 25/6 | 20/- | 7½ | 7½ | 22/6 | .. | 6 13 4 |
| Mather & Platt | 46/6 | 30/- | 13½ | 10 | 33/9 | .. | 5 18 6 |
| Metropolitan Elec. Cable Pf. | 22/- | 21/3 | 5½ | 5½ | 21/3 | .. | 5 3 6 |
| Murex | 86/9 | 52/6 | 20 | 20 | 67/6 | .. | 5 18 4 |
| Pye Deferred (5/-) | 9/- | 6/9 | 25 | 25 | 8/9 | .. | 14 5 8 |
| Revo (10/-) | 20/9 | 12/6 | 17½ | 5 | 12/6 | .. | 4 0 0 |
| Reyrolle | 60/6 | 41/- | 12½ | 12½ | 43/9xd | +9d. | 5 14 2 |
| Siemens Ord. | 23/9 | 16/3 | 7½ | 7½ | 16/3 | −1/4 | 9 4 8 |
| Strand Elec. (5/-) | 2/3 | 9d. | 10 | 4 | 1/3 | .. | 16 0 0 |
| S. Smith (1/-) | 8/- | 3/6 | 37½ | 50 | 6/3 | .. | 8 0 0 |
| Switchgear & Cowans (5/-) | 11/9 | 5/6 | 20 | 10 | 6/3 | .. | 8 0 0 |
| Telegraph Condenser (10/-) | 8/9 | 6/3 | 5 | .. | 8/9 | .. | — |
| Telegraph Construction | 42/6 | 29/- | 10 | 10 | 30/- | .. | 6 13 4 |
| Telephone Mfg. (5/-) | 9/- | 5/- | 9 | 9 | 5/9 | .. | 7 16 6 |
| Tube Investments | 96/9 | 61/3 | 23¾ | 23¾ | 80/- | +3d. | 5 18 9 |
| Vactric (5/-) | 3/6 | 2/- | 4 | Nil | 2/3 | .. | — |
| Vickers (10/-) | 22/- | 9/6 | 10 | 10 | 13/3 | .. | 7 11 0 |
| Ward & Goldstone (5/-) | 19/9 | 12/6 | 20 | 20 | 12/6 | .. | 8 0 0 |
| Westinghouse Brake | 46/- | 32/9 | 17½ | 10 | 32/6 | .. | 6 3 1 |
| Walsall Conduits (4/-) | 26/6 | 17/6 | 55 | 55 | 23/9 | .. | 9 5 0 |
| West, Allen (5/-) | 7/- | 3/- | 10 | 7½ | 3/9 | .. | 10 0 0 |

* Dividends are paid free of Income Tax.

# CONTRACT INFORMATION

## Particulars of work for which tenders are invited, contracts placed, and building schemes promising work for electrical contractors and traders

## Contracts Open

*Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses. Further details of items marked with an asterisk can be obtained from the Department of Overseas Trade (Inquiry Room), Great George Street, London, S.W.1.*

**Australia.** — SYDNEY. — October 24th. County Council. One 50,000-kW steam turbo-alternator set for the Bunnerong power station. (T. 16057/40.)*

MELBOURNE.—State Electricity Commission. October 15th. 4,000 ft. of cable for use on a three-phase 6.6-kW system. (T.21227/40.)*

**Hazel Grove & Bramhall** — October 21st. Electricity Department. Two 750-kVA transformers. (See this issue.)

**Keighley.**—Electrical installation in the Mansion House, Victoria Park; E. G. Felgate, borough architect, College Street.

**Manchester.**—October 10th. Electricity Committee. Supply, delivery and erection at substations during twelve months ending December 31st, 1941, of three-phase, four-wire, 400/230 V, AC switchgear. (September 30th.)

**Newport (I.O.W.).**—October 4th. Town Council. Installation of low-voltage electric light from mains and/or batteries to approximately 48 school shelters on 10 separate sites. Specification and forms of tender from H. G. W. Cook, borough engineer and surveyor, 38, Quay Street. Tenders to R. Preston, town clerk, Municipal Offices, 17, Quay Street.

**New Zealand.**—WELLINGTON.—October 8th. Public Works Department. 20,000-kVA synchronous condenser with control and protective equipment. (T. 21199/40.)* Four 2,500-kVA transformers or alternatively eight 1,677-kVA transformers. (T. 21197/40.)*

October 15th. 66-kV outdoor switchgear and steelwork for Winton substation. (T. 21206/40.)*

Public Works Department. October 22nd. Transformers and relays.

October 29th. Two motor-driven pumps and equipment. (T. 21604/40.)*

November 5th. 110-kV gang-operated outdoor type switchgear. (T. 21700/40.)*

**South Africa.**—PRETORIA.—Union Tender and Supplies Board. October 24th. Three batteries (twenty-six 600 Ah cells each). (T. 21552/40.)* Miscellaneous electrical requisites. (T. 21549/40.)*

November 14th. 10 batteries each of 12 cells. (T. 21981/40.)* 7,500 telephones, table, magneto. (T. 21980/40.)*

October 10th. Public Works Department. Laundry machinery, including electric motors, for Krugersdorp Mental Hospital. (T. 21352/40.)*

One 15-kW Diesel engine lighting plant for the Agricultural College, Glen, O.F.S. (T. 21351/40.)*

CAPE TOWN.—October 8th. Electricity Supply Commission. Two 2,000-kVA transformers. (T. 21222/40.)*

November 12th. Two 300-kVA three-phase transformers. (T. 21801/40.)*

November 18th. 910 yd. 0.2 sq. in. three-core belted type cable, 11,500/12,000 V, and 910 yd. six-core 7/.029 in. pilot cable. (T. 21988/40.)*

November 20th. City Council. Low-voltage industrial-type switchboard. (T. 22052/40.)*

December 4th. Laundry equipment. (T. 21987/40.)*

PORT ELIZABETH.—October 10th. City Electrical Engineer's Department. Water tube boiler. (T.Y. 21035/40.)*

October 24th. City Electrical Engineer's Department. Transformers, low-voltage units, &c. (T.Y. 21558/40.)*

JOHANNESBURG.—October 19th. City Council. Electric lamps. (T. 21542/40.)*

October 24th. Public Works Department. L.v. underground cable. (T.Y. 21433/40.)*

October 14th. Four switchboards and two 400-kVA transformers. (T. 21795/40.)*

November 14th. Electric lighting fittings for new magistrates' courts. (T. 21976/40.)*

KIMBERLEY.—October 31st. City Council. 33-kV transmission system between central power station of De Beers Consolidated Mines, Ltd., and Vaal River municipal waterworks (18¼ miles). (T. 21888/40.)*

**South Shields.**—Installation of electric lighting at General Hospital; surveyor, Town Hall, South Shields.

**Stoke-on-Trent.**—October 9th. Electricity Department. Replating battery. (September 20th.)

**Straits Settlements.**—SINGAPORE.—November 11th. Municipal Electricity Department. Three 300-kVA and five 500-kVA static transformers. (T. 1826/40.)

## Orders Placed

**Aberdeen.**—Town Council. — Accepted. Electrical fittings for three months.—W. Wilson & Co.

**Brighton.**—Corporation. Accepted. The following items for Southwick power station: Cables—British Insulated Cables, Ltd., Aberdare Cables, Ltd. and Standard Telephones & Cables, Ltd. Lagging for steam pipes at Southwick—Dick's Asbestos Co., Ltd. Work of lagging steam and feed pipes, etc., of Nos. 2 and 4 Babcock and Wilcox boilers (£321)—Dick's Asbestos Co. Ltd.

Electricity Committee. Recommended. Triple effect P. & B. evaporator with a net output of distilled water of 15,000 lb./hr. (£4,520)—Aiton & Co. Ltd.

**London.**—SOUTHWARK.—Electricity Committee Accepted: High-voltage switchgear (£200)—G.E.C. Low-voltage fuse unit (£15)—Reyrolle & Co. 150-kVA Hackbridge transformer (£125)—County of London Electric Supply Co. 0.1-sq. in. 11-kV cable (£335)—Pirelli-General Cable Works.

**Sheffield.** — Town Council. Accepted. Electric passenger vehicle (£516).—General Motors (Sheffield).

**Worcestershire.**— Education Committee. Accepted. Electrical installation at Hill and Cakemore Senior School (£452).—Gwilliam Bros. Electrical installation at Pershore Junior School (£210).—S.W.S. Electric Power Co.

## Contracts in Prospect

*Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.*

**Brighton.**—Shelters for 2,000 persons; borough engineer.

**Cradley Heath.**—Works extensions; B. and C. Worton, Banner Street.

**Durham.**—Remodelling of Flint Hill School (£3,700); F. Willey, county architect, 34, Old Elvet, Durham.

**Eire.**—NORTH CORK.—Millstreet water supply scheme including pump house, pumping plant, motors, &c., for Board of Health; Secretary's Office, County Hospital, Mallow.

**Grimsby.**—Cleansing centre (£1,100); borough engineer.

**Guisborough.**—Three shelters at Lackenby for the U.D.C.; Walter Thompson, builder, Northallerton.

**Hemsworth.**—Shelters (£20,000) for R.D.C.; surveyor, 18, Common Road, South Kirkby, South Elmsall.

**Hereford.**—Works extensions; Painter Bros., Ltd.

**Isle of Wight.**—Public elementary school, Blackpan, for County E.C.; C. Gregson, county architect, County Hall, Newport, I.O.W.

**Keswick.**—Communal shelters for U.D.C.; surveyor, Council Offices, Keswick, Cumberland.

**Knott Mill.**—Extensions for Lancashire Coachways, Ltd.; G. Bullimore, architect, Hampstead, London, N.W.3.

**London.**—School shelters (£6,000); L.C.C. architect.

**Long Eaton.**—Sewage disposal works including pumping station for U.D.C.; H. Raven, engineer, Town Hall, Long Eaton, Nottingham.

**Malton.**—Public shelters, Highfield Road and Peasey Hill, for U.D.C.; surveyor, Council Offices, Market Place.

**Manchester.**—Skating rink, Upper Chorlton Road, for A. Thompson; C. A. Broadhead, architect, Devonshire House, Moorgate Street, Rotherham.

**Maryport.**—Houses (100); U.D.C. surveyor, Town Hall.

**North Cotswold.**—Houses (39) for R.D.C.; surveyor, Council Offices, Moreton-in-Marsh, Glos.

**Northern Ireland.** — COLERAINE. — Boiler house for Committee of Macosquin Presbyterian Church; R. H. Surgenor, Dundarg, Coleraine.

BELFAST.—First-aid post; city surveyor, Room 92, City Hall.

**Plymouth.**—Reconstruction and repairs, Ford House, Swilly; housing estates manager, Old Guildhall, Whimple Street.

**Runcorn.**—Youth centre for R.D.C.; Clerk's Office, Castle Park, Frodsham.

**St. Neots.**—Houses, Waterloo House site and Potton Road, Eynesbury; S. B. Parkinson, architect, 80, High Street, Huntingdon.

**South Cambridgeshire.**—Workshop premises at pumping station for R.D.C.; H. Hales, clerk, County Hall, Hobson Street, Cambridge.

**Southend-on-Sea.**—Communal shelters at Old Town, Leigh; borough engineer.

**South Shields.**—Conversion of The Anchorage into flats; J. H. Morton & Son, architects, Fowler Street, South Shields.

School shelters (£18,000) and refuge rooms; A. G. Richardson, borough engineer.

**Stratford-on-Avon.**—Reconstruction of sewage disposal works for R.D.C.; A. E. Marshall, of Willcox, Raikes and Marshall, Great Charles Street, Birmingham.

**Welshpool.**—The Council proposes to purchase a site for the provision of a public abattoir.

**West Ham.**—Communal shelters on five sites, and public shelter; Borough Engineer's Department, Town Hall, E.15.

**West Kesteven.**—Chapel and schoolroom, corner of Drift Lane and Lincoln Road, Barkston, for R.D.C.; surveyor, Council Offices, 19, Watergate, Grantham.

**Workington.**—Additional houses (99) on the Salterbeck estate, for T.C.; borough engineer, Town Hall.

## INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, &c., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following:—

"UTILITY" hairdryers.

"UTILAIRE" conditioning units for A.R.P. shelters.